Railway Age Gazette

DAILY EDITION

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Vol. 54. NEW YORK—JUNE 19, 1913—ATLANTIC CITY No. 24f.

PUBLISHED EVERY FRIDAY AND DAILY EIGHT TIMES IN JUNE, BY THE
SIMMONS-BOARDMAN PUBLISHING COMPANY,
WOOLWORTH BUILDING, NEW YORK.

CHICAGO: Transportation Bldg. CLEVELAND: Citizens' Bldg.
LONDON: Queen Anne's Chambers, Westminster.

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United States and Mexico $5.00
Canada 6.00
Foreign Countries (excepting daily editions) 8.00
Single Copies ..... 15 cents each

Engineering and Maintenance of Way Edition and four Maintenance of Way Convention Daily issues, North America, $1.00; foreign, $2.00.

Entered at the Post Office at New York, N. Y., as mail matter of the second class.

WE GUARANTEE that of this issue more than 9,200 copies were printed; that of those more than 9,200 copies, 7,048 were mailed to regular paid subscribers, 200 were provided for counter and news companies' sales; and 1,700 were printed for distribution at Atlantic City and for use as sample copies.

THE arch bar truck for freight cars was for many years practically standard. Numerous designs intended to replace it were developed from time to time, but the arch bar type retained its position as a favorite, and has given excellent service under both freight cars and locomotive tenders. With the increase in the weight and capacity of freight cars, however, the problems of maintaining these trucks have increased enormously; not the least of these is the cracking of the arch bars, and the construction of this type of truck makes repairs in a case of this kind slow and expensive. Broken column bolts are another source of annoyance and expense, and the difficulty of keeping the various bolts supplied with nuts is well illustrated by the fact that recently on the western district of the New York Central a ton of nuts was used for this purpose in one day. In view of these conditions, and the proportion which car maintenance repair bills have assumed, the general adoption of a type of truck which will give better service under heavy equipment than the arch bar type would seem worthy of the most careful consideration. There are several satisfactory designs of the cast steel frame truck now in use, and it is probable that it is in this direction the railroads will have to turn to find relief.

THE convention started out yesterday morning with something that might be construed into a semblance of an indignation meeting. It was on the subject of damage inflicted on cars in their passage through car dumping machines. The matter has been one causing constant annoyance and trouble for a number of years, and representatives of the railroads have made suggestions before this for minimizing the damage. Cars have been strengthened along the upper edge so as to withstand the crimping effect of the clamps, and the method of blocking has been criticised and suggestions made for bettering it. In some cases agreements have been made that certain inprovements in the machine should be made. It was agreed that the work should be done, but nothing was changed. It is a matter regarding which the roads on which the machines are located are especially interested, because the majority of cars handled are home cars; but every road in the country that has a car liable to go through the machine is interested. Evidently some of the car owners are getting to be very much in earnest, and as Mr. Crawford suggested, they want the weight of the influence of the association behind them in the form of a definite recommendation to enable them to bring an effective pressure on machine owners and builders to compel them to so adjust and build their machines that the injuries shall cease to be inflicted.

HAVE we taken "into consideration also the question of reducing the cost of maintenance and operation of equipment?" This question was asked by President Fuller in his address Monday morning. The capacity of cars has been increased so rapidly during recent years and the stress to which they have been subjected because of the use of more powerful locomotives and the more general introduction of hump yards has increased so much that the designer in trying to keep up with the other demands has perhaps lost sight of the question of the cost of maintenance and operation; in many cases the management has cut out important features which have been recommended by the designers in order to save a few dollars on the first cost of the equipment. The result of this short-sighted policy is evident on many roads in the high cost of maintenance. As the claims for damaged freight have grown to excessive proportions and more attention has been given to the possibility of reducing maintenance costs it has become evident that it is often good policy to spend more money in building the cars right in the first place. Attention was greatly diverted to the desirability of doing this by the series of articles on "Defective Box Cars and Damaged Freight," which was published in the *Railway Age Gazette* during the early part of 1912. The committee report on Overhead Inspection of Box Cars at the 1912 convention also emphasized this, and the report of the same committee this year will undoubtedly direct still further attention to it. Meanwhile the car designers have been giving more attention to studying the performance of different designs in order to develop more practical construction and the railway managements have been disposed to pay more to get the right kind of cars, realizing that it is economy to do this because of the resulting better service, reduced maintenance costs and greater safety to the public and employees. This is real economy, if rightly done, but as suggested by President Fuller, the railways should be sure that such additional expenditures as are made will justify themselves fully.

THERE is a question in the minds of some of the members of the M. C. B. Association as to just what was intended by the action which was taken on the section of the report of the committee on Brake Shoe and Brake Equipment relating to a standard brake beam. Last year the committee recommended the adoption of a standard No. 2 brake beam, but this recommendation was rejected when it was referred to letter ballot. In bringing the matter before the convention this year the committee made a slight change in the No. 2 beam recommended last year, and referred it to the association with this suggestion: "The committee would also recommend the beam as shown on M. C. B. Association Sheet 17-B for consideration and trial by members of the association, with a view of adopting such a beam as recommended practice for No. 2 M. C. B. brake beam." Without doubt the committee's intention was not to submit the question to letter ballot, but rather to have the different members experiment with the beam with the idea of adopting it as standard practice at some future time. Mr. Kleine moves that the recommendation be submitted to letter ballot, but A. W. Gibbs directed attention to the fact that the brake head shown on sheet 17-B was covered by two patents which were held by one company. C. D.

Young therefore made an amendment to Mr. Kleine's motion to the effect that the patent situation be disposed of by the executive committee before the matter is referred to letter ballot. The motion thus amended was carried. As the matter now stands the question will, it would seem, be referred to letter ballot if the executive committee can adjust the patent situation, although, judging from the wording of the committee's report it was not its intention to have it take quite this course.

PRESIDENT Fuller's experience meeting was a happy thought to fill in a few minutes made available by the run ahead of schedule yesterday morning. To those who listened to the men who eased their minds, if not their consciences, it seemed as though such an experience meeting might well be made a permanent feature of the convention. It happened to come just after the report on car construction had been read and discussed, so it is but natural that the major portion of the comments were directed towards faulty cars, but if so much could be brought out in so short a time bearing on this one topic, there must be a tremendous reserve of material stored away that might well be brought to light. Doors and end construction were the principal points of attack, and the former may well be taken as an item of crucial anxiety. It is a matter common to hear expressions of anxiety at the possibility of danger to passing trains caused by loose doors, and as for end construction, we have been talking about it for decades and now it really seems that something will be done. And such talks as these cannot fail to stiffen the recommendations of committees and encourage the association to take a stronger and more definite stand than it has sometimes done in the past in regard to seemingly minor affairs.

THE discussion on the subject of car construction seemed strongly to indicate the necessity of a standing committee on that subject, and the motion of Mr. Crawford for the appointment of such a committee was enthusiastically carried. While the committee presented a very interesting and instructive report, there were many questions asked by the members that were not touched upon. With a standing committee these questions could be carefully studied and a report be made for the benefit of all the members of the association. A standing committee is especially apropos at this time since the American Railway Association is looking forward to, and asking the various railroads for, a standard box car. Again, the work of this committee would be of special value toward the developing of standard designs and the passing on of special designs which would eliminate many of the difficulties experienced in the interchange of cars. It would be the duty of the committee to prevent such 60,000 lb. capacity cars, as were mentioned in the discussion on the retirement of the 40,000 and 50,000 lbs. capacity cars, from being constructed and in general would be of vast importance not only to the mechanical department, but to the transportation department as well. With the adoption of the new and heavier couplers there must be some change in the end construction of cars. The various parts must be carefully designed to back up the work the coupler is supposed to do, and this standing committee is just the one to advise and recommend what should be done. With the backing of the association for stronger and more substantially designed cars the committee is in a position to do the railroads of this country a very valuable service. The committee, however, cannot be expected to do its work sucessfully without the assistance of all the members of the association, and if the way in which the report was discussed is any indication, this assistance will be forthcoming.

AIR BRAKE HOSE.

AN average life of ten months for air brake hose manufactured under the present M. C. B. specifications, which the investigation of the committee showed to be the condition now existing, is a conclusive argument in favor of a revision. The committee has evidently given the subject most careful study and submitted, at yesterday's session, a proposed specification which would seem to insure a materially better product. A good air brake hose is a matter of more importance than the cost of replacing it after a short life and the fact that the new hose will cost considerably more than at present should not enter into consideration. Train delays due to a leaking train pipe, the occasional wreck due to a bursted hose and the cost of frequently keeping two of the largest air pumps running at full speed all the time are worth avoiding even if the longer life of the hose itself does not offset the increased cost.

Permission to use a machine made tube is given in the new specifications, which will be submitted to letter ballot for adoption as a standard. As a matter of fact a large percentage of the present hose has a machine made tube, although the specification calls for three, hand made calenders. It is practically impossible for an inspector to determine the presence of the three calenders unless one is of a different color, as is required in the specifications of a few railroads. The objection to the machine made tube is not that it is machine made, but that; when made of poor material, it shows a serious porosity. The new specification attempts to insure a high quality of material by means of new tests and in that case it is felt that advantage should be taken of the lower cost of the machine made product.

A tensile strength requirement and a more rigid stretching test are the principle means offered for insuring a good quality of rubber. Experience covering several years will tell if they do it. At present they seem to be the most available means. At a later date there is a slight possibility that a chemical analysis will be perfected which can be used to make the quality more uniform and positive. The tensile test now proposed requires that with a speed of the machine of 20 in. a minute the inner tube must have a strength between 800 lb. and 1200 lb., per sq. in. after an elongation from 2 in. to 10 in. The cover material must have a strength between 700 lb. and 1100 lb. per sq. in. under the same conditions. The stretching test required at present is from 2 in. to 8 in., released, remarked, again stretched from 2 in. to 8 in. and held 10 minutes. A permanent set of ¼ in. is allowed after it has been released for 10 minutes. In the proposed specification, both stretches shall be from 2 in. to 10 in. and the set immediately after releasing the second time is not to exceed ¼ in. and the set 10 minutes later is not to exceed ⅛ in.

Other new features of the proposed specifications are the introduction of a porosity test and the more severe hydrostatic and bursting tests. The new porosity test is made by putting the test hose under 140 lb. air pressure for 5 minutes and then splitting the cover with a knife and submerging the hose in water. Any escape of air of sufficient volume to indicate leakage through the inner tube will condemn the lot of 200. The new hydrostatic test is 200 lb. instead of 100 as at present and the bursting test has been increased from 400 lb. to 500 lb., both for 10 minutes.

More definite instructions are also given in connection with the quality of the wrapping and its application. The weight and width remain the same but the warp is required to have 25 threads, of a strength of 12 lb. each, to the inch and the filler 18 threads of 9 lb. strength. The edges are required to lap ½ in. No change is suggested in the friction test, but less than four ply hose will not be accepted.

In connection with the new hose specification, the committee made no sugestion about the proper way of mounting. This is fully as important as insuring a good hose and instructions are sadly needed by some railroads. Good hose spoiled before it is put in service is not as safe as poorer hose properly handled and applied.

MASTER CAR BUILDERS' ASSOCIATION PROCEEDINGS.

Closing Session—Unloading Machines, Air Hose, Revision of Specifications, Car Construction; Election of Officers.

President Fuller called the meeting to order at 9:30 A. M., June 18.

Secretary Taylor read a proposal to elect C. A. Seley, an associate member, and under the rules of the association this will lie over until the next meeting.

DAMAGE TO FREIGHT EQUIPMENT BY UNLOADING MACHINES.

The committee finds that considerable damage has been done not only by the Pennsylvania and Lake Shore & Michigan Southern, as reported last year by the Baltimore & Ohio, Wheeling & Lake Erie, Hocking Valley, Toledo & Ohio Central, and others.

There are two types of car dumpers in use; one in which the track or platen on which the car rests is moved transversely, bringing the side of the car against the side of the cradle, and referred to as the movable-platen type; the other is that in which the track is built solid with the cradle, and the cradle side is moved in against the car side by means of hydraulic cylinders, and is referred to as the solid-floor type.

MOVABLE-PLATEN TYPE.

The supporting track on the platen has its center coincident with that of the supply track leading to the machine, when cradle is at its bottom or normal position, as in Fig. 1, this being controlled by cams underneath the platen. When cradle is raised the cams become disengaged and chains which are attached to platen, and which pass through hollow clamps and extension clamps to counterweights, move the platen transversely, bringing car against side of cradle. As the cradle continues to rise the hook clamps, which move by their own weight in guides, bear on the top of car and hold car to platen by

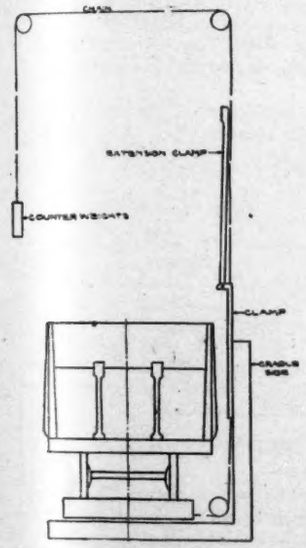


Fig. 1—Showing Car in Position Before Cradle is Raised.

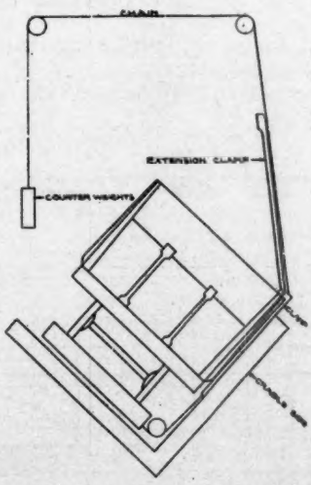


Fig. 2—Showing Position of Clamps as Cradle is Turned.

the combined weight of the clamps. When the cradle rotates to dump the car the extension clamps are brought over the top of car as shown in Fig. 2.

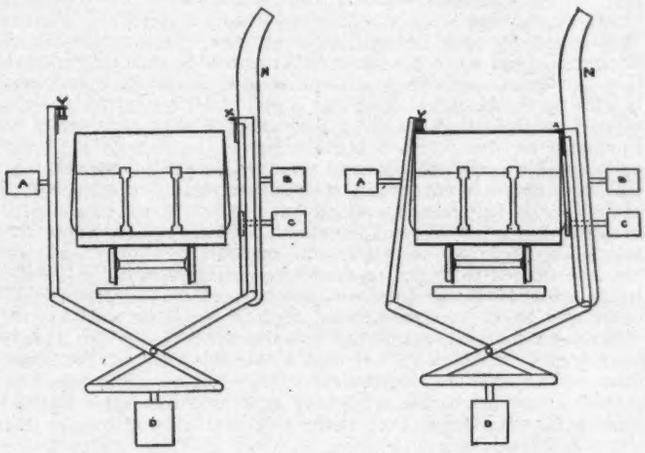
SOLID-FLOOR TYPE.

Diagrams of cradle and method of clamping car is shown in Figs. 3 and 4. It must be understood that the sequence of clamp operations can be varied, as the movement of hydraulic pistons is controlled by independent valves. When car is placed on supporting track the pistons *A*, *B*, *C* and *D* are all in release position. The cradle side is first moved in against top of car by piston *B*, bringing clamp *X* over car side and outside. Clamp *Y* is brought over car side by piston *A*. Both clamps are next brought down on top of car by piston *D*. Buffer is then brought out against car by piston *C*, thus making all clamps in operation, as in Fig. 4, and cradle is then rotated about center *N*.

With machines of movable-platen type the damage occurs when the cradle of the car dumper is rotated, due to their not having proper bearing against the side of the cradle, the side of car coming in contact with the clamp housings or side of cradle, and damaging or destroying the side ladders, handholds, roping staples or door-operating mechanism, and by the absence of extension clamps.

With machines of the solid-floor type the damage is done by hydraulic-operated clamps in the sides of the car and bending down the top of the car, and I beam of floor system outside of rail being too high and striking column bolts.

To prevent the damage to cars, the cradle on both types of



Figs. 3 and 4—Method of Clamping Car on Solid Floor Type.

dumpers should be faced with timber, preferably 10 inches thick, on specified areas and with openings between the timbers. The timbers are provided for the car to rest against when rolled on its side, and the openings are to permit of contents that have fallen into cradle being dumped on the next turn of the cradle. The blocking is so arranged as to protect the extending appliances by providing for them in areas not covered with blocking. On the machines of solid-floor type the method of moving cradle side will have to be changed so that the side pressure on car will not be greater than the combined weight of the heaviest car and its contents, and so that the vertical clamping will not exert a pressure on top of the car greater than that now used on the movable-platen type.

The principal features to be considered in providing the protection for both types of machines are, therefore:

First: Provide as much bearing as possible on the cradle side of the car and at the same time insure ample clearance for safety appliances and other attachments projecting beyond side stakes of the car.

Second: Allow for sufficient variation for spotting cars in the cradle, so that time will not be lost in placing the cars, with a resulting decrease in the capacity of the car dumper. The protection should be so placed that when a car is stopped anywhere within two feet the blocking will be ample to support the car on its side. A greater allowance than two feet is to be preferred when it can be provided without making a supporting area so small that the car will be damaged.

Third: Provide blocking so that the bearing face can be quickly renewed, so that it may be maintained in proper condition at all times by applying it when the machine is idle, to avoid the necessity of shutting down the dumper to apply the blocking.

Fourth: Provide a guide plate at the in-bound end of cradle for entering cars with spread sides.

Fifth: Machine to be provided with not less than four vertical clamps, and each of these to be equipped with an extension clamp.

Sixth: Grade of yard track leading into cradle to be of 100 ft. radius, to prevent damage to carry irons when cars are moved into machines coupled.

Seventh: Timber lining to be cut at an angle at lower ends to permit the contents spilled into the cradle to get out on the

next turn of the cradle. Features to be considered in addition to the above, but only on solid-floor type machines, are:

Eighth: No side pressure to be used which will force the car against the lining in the cradle with a pressure greater than the combined weight of the car and contents.

Ninth: Vertical clamps to be operated by gravity so that the pressure on top of the car will not exceed that now used in movable-platen type machines.

Tenth: Top of I beam in floor system and just outside rail to be made the same height as rail.

The committee finds that to provide a lining or blocking for gondola and hopper cars owned by all railroads, could only result in insufficient support for a great many cars. It is therefore necessary for each railroad to make a study of the cars handled by machines on its lines and apply blocking according to the foregoing principles, and the typical example shown in Fig. 3. The modifications for the solid-floor type alone, as given in the eighth, ninth and tenth items, will have to be provided for by the machine designers.

Fig. 5 is a typical blocking used by the Pennsylvania and Lake Shore & Michigan Southern on machines of the movable-platen type, and the committee calls attention to the additional clearance necessary in the Sandusky car dumper to prevent damage to the side wheel operated cars of the Norfolk & Western. If it were not necessary to provide this clearance in this particular machine, a greater bearing could be given cars by cutting the blocking along the line *F G H* instead of *C D E*, along *V K L* instead of *U I J*, and along *M N* instead of *O P*. Furthermore, the recessed portion below the line *Q R* is for existing vertical handholds, and the surface can be brought out full with the balance of the blocking down to the line *S T* after July 1, 1916, when vertical handholds are no longer permissible, for all horizontal handholds will then pass below the line *S T*. Fig. 6 shows manner of applying guide for entering car with bulged sides and method of securing blocking to cradle. In securing blocking the 6-in. timber next to the cradle side is secured by ¾-in. bolts passing through wrought washers, recessed into the timber and through the cradle side. The bearing face, 4 in. thick, is secured by ¾-in. bolts in the same manner through the permament timber. The same blocking should be applied to the solid-floor type machines after the designers have modified the cradle side and clamps as per the ninth and tenth items.

Attention is also called to the following, and the necessity of each railroad giving the proper consideration in connection with car dumpers operated by it and by plants along its line:

Composite drawings of all cars to be handled by machines should be prepared and drawings for the blocking furnished to the contractor when the machine is purchased, in order that he may provide the necessary blocking, means of securing it, and reinforcement back of the cradle to support the weight of the car when on its side. When designing new cars, some

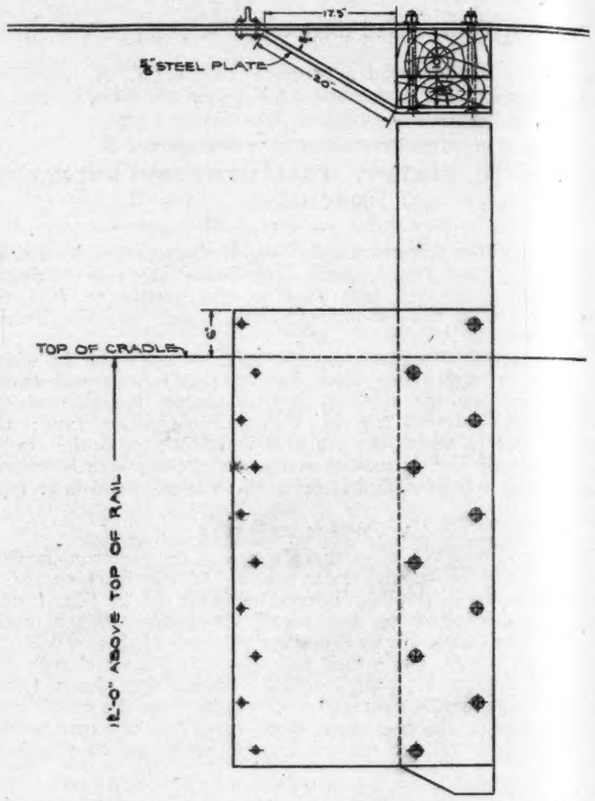


Fig. 6—Guide Plate for Cradle with Top of Cradle 12 ft. Above Top of Rail.

thought should be given to their use on car-dumping machines. The providing of protection in acordance with this report should be taken up with plants operating car dumpers along the line of railroad, as much damage is done at steel and other manufacturing plants. When applying this blocking to existing machines, the back of the cradle wall or side should be reinforced to prevent bulging and making the blocking useless. Extension clamps through which chains pass must be used at all times to prevent damage to the car sides by chains. Face plates must not be used on the face of timbers, as cars will slip on metal-plated blocking.

This report has been made covering car-dumping machines. There are other machines and appliances used in loading and unloading cars which require additional study. Regarding recommendations for a suitable wrench for opening hopper-bottom cars, and a uniform size of shafts under these cars, the committee finds that in order to fully cover this subject it is necessary to collect and consider all forms of operating mechanism for hopper-bottom cars, but it has not yet been able to get this information, and would therefore ask for further time.

The report is signed by:—P. F. Smith, Jr., (Penna. Lines) chairman; J. J. Tatum, (B. & O.); E. A. Westcott, (Erie); I. S. Downing, (L. S. & M. S.); J. J. Birch, (N. & W.), and C. S. Morse, (W. & L. E.).

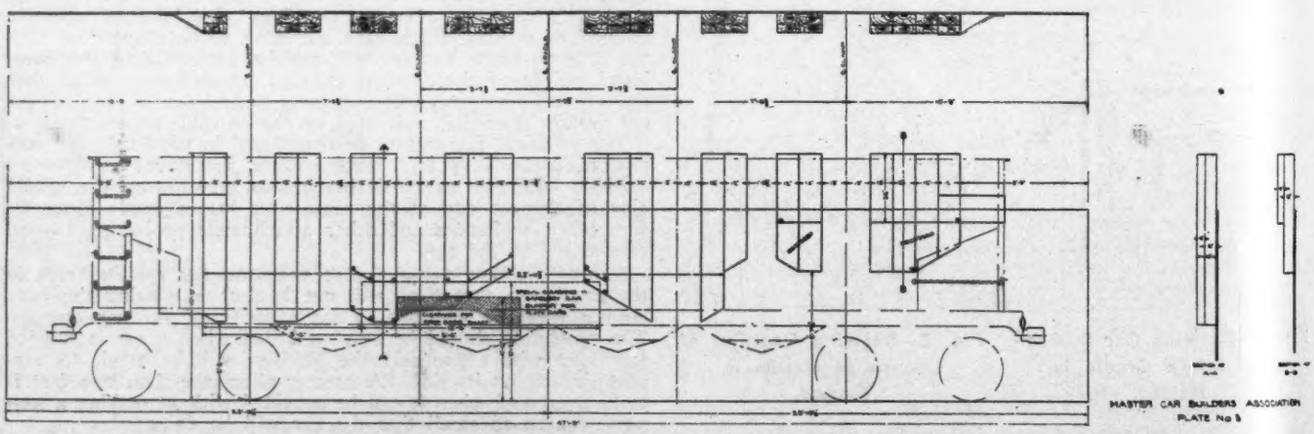


Fig. 5—Typical Blocking Used by Pennsylvania and Lake Shore on Machines of the Movable-Platin Type.

Discussion.

D. F. Crawford (Penna. Lines): This subject is very important to several of the roads that handle coal and ore between Pittsburgh and the lakes. Recently an examination of some of the machines was made by some of our people, and we find that the blocking has not been put in in accordance with the recommendations of the committee, representing those roads which gave this subject particular atten-

tion before this committee was appointed. It is most important that this subject receive the attention of the roads on which these machines are located, and also that the roads jointly take the matter up with the various manufacturers who have machines of this kind. A large number of cars is being very seriously damaged. I have had some reports sent to me since I have been here, of a number of cars belonging to our lines, the Lake Shore and the B. & O., and the other lines that run into this territory. I think this committee should be continued to not only make definite recommendations on this machine, but others that can do damage to these cars. These machines will damage the best and latest cars we have. In one case a new car was put in and clamped, and the side was deflected two and one half inches. I have some photographs of the hopper cars of the Pennsylvania, the Lake Shore and the B & O., and the sides are bulged; and undoubtedly it was due to the clamping of this machine. I hope the Committee will make definite recommendations, and have your people devise a machine that will stop injury to the latest and best cars we own.

J. J. Tatum (B. & O.): The committee was very much surprised to find the conditions existing on the various machines which they inspected. Cars were being unnecessarily damaged and it seems that it was due principally to lack of careful watching and considering what was necessary to be done to the machine to prevent damage. The clamping action of the machine is very considerable. There is one machine which has a hydraulic buffer on the side. That machine crushes in the sides of the car and causes them to be thrown out of alignment, and the result is that the girder effect, the principle on which the car is built up for strength, is rendered practically worthless. An I-beam put along the floor of the platform of the machine comes close to the side of the track. All of us have had column bolts sheared off and we found that when the car was approaching the machine, the grade was not properly adjusted and the result was that the column bolts were sheared off. The grade was not adjusted to suit the spacing in the couplings, and when the machine would approach the car, it would bind the knuckle and break the carrier iron. There are a number of items about the machines which must be given consideration by each railroad to prevent damage to the cars.

Samuel Lynn (P. & L. E.): I am a member of the local committee which proposed some of these machines on our line. One of the troubles we have had is the shearing off of the carrier iron. I think, though, that is a condition that we have corrected to a large extent with the mill people.

D. F. Crawford: Are these diagrams in shape to be submitted to the association for adoption as recommended practice, so that we can put the weight of the association behind our arguments with the various people who own these machines, both individuals and railroads?

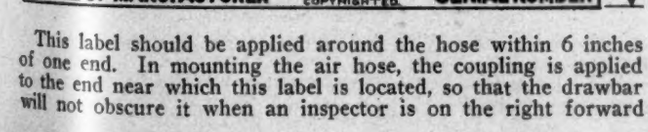
J. J. Tatum.—The recommendation of the committee is in such shape, and it would be proper to make such a suggestion.

D. F. Crawford.—I move that the recommendations of this committee be properly prepared to be submitted to letter ballot as recommended practice of the association. Remember that the cars of every railroad company which go through the machine, suffer just the same.

The motion was carried.

AIR BRAKE HOSE SPECIFICATION.

One of the items discussed by the committee was that of labels for air hose. The inspection of any pile of scrap hose will indicate that the calendar, from which is supposed to be cut the date of application and removal of the hose, is seldom used. It is, therefore, evident that the ends for which this label was designed are not being lived up to, and that its usefulness is questionable. The addition of a second label, which is supposed to indicate to car inspectors, without the necessity for their going between cars, that such hose is M. C. B. standard, means considerable extra and unnecessary expense. In the opinion of the committee, both the present labels should be discontinued, and in place of them the following design is recommended:



This label should be applied around the hose within 6 inches of one end. In mounting the air hose, the coupling is applied to the end near which this label is located, so that the drawbar will not obscure it when an inspector is on the right forward or left back side of a car. As this label contains all necessary information, and as the life of a hose can be exactly known from the date of manufacture shown, it is recommended that this question receive the most careful consideration of each member voting.

Following is the specification which the committee feels will accomplish a large improvement of air-brake hose.

Proposed Revision of Specification for Air-brake and Signal Hose.

Adopted as Recommended Practice in 1901. Advanced to Standard in 1903. Revised 1905. In 1911, detail specifications of label were placed under the heading "Label for Air-brake Hose."

I. MANUFACTURE.

1. All air-brake hose shall be soft and pliable, and not less than four-ply. It shall be made of rubber and cotton fabric, each the best of its kind for the purpose. No rubber substitutes or short-fiber cotton to be used.

II. PHYSICAL PROPERTIES AND TESTS.

Hose will be subjected to the following tests:

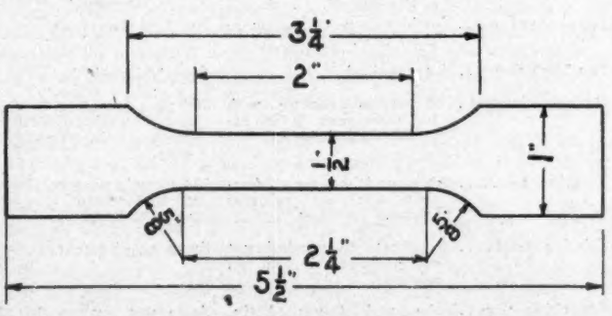
2. *Porosity Test.*—A hose will be selected at random and filled with air at 140 pounds pressure for five minutes. At the end of this time the rubber cover will be split with a knife and the hose submerged under water. This test is to determine the porosity of the inner tube. The escape of air must be distinct enough so that the porosity will not be confused with the escape of air which is confined within the structure of the hose. This test determines whether or not the lot of two hundred is accepted or rejected.

3. *Bursting Test.*—The hose selected for test will have a section 5 in. long cut from one end, and the remaining 17 in. will then be subjected to a hydraulic pressure of 200 lbs. per square inch, under which pressure it shall not expand more than ¾ in. in circumference nor develop any small leaks or defects. This section must then stand a hydraulic pressure of 500 lbs. per square inch for ten minutes without bursting.

4. *Friction Test.*—A section 1 inch long will be taken from the 5-in. section previously cut off and the quality determined by suspending a 20-pound weight to the separated end, the force being applied radially and the amount of unwinding shall not exceed 8 in. in ten minutes.

5. *Stretching Test.*—Another section 1 in. long will be cut from the remainder of the 5-in. piece, and the rubber tube or lining will be separated from the ply and cut at the lap. Marks 2 in. apart will be placed on the section, and then the section will be quickly stretched until the marks are 10 in. apart and immediately released. The section will then be re-marked as at first and stretched to 10 in. and will remain so stretched 10 minutes. It will then be completely released, and within thirty seconds of the time of releasing the distance between the marks last applied will be measured, and the initial set must not be more than ¼ in. At the end of ten minutes, distance between the marks will be again measured, and final set must be not more than ⅛ in. The small strips taken from the cover will be subjected to the same test.

6. *Tensile Strength.*—With a specially designed die of the following dimensions:



Tensile Specimen.

Test pieces will be cut from the tube and cover and pulled in a tensile machine with a test speed of 20 in. per minute. After an elongation of at least 10 in., the inner tube must have a tensile strength of between 800 and 1,200 lbs. per square inch, and the cover 700 to 1,100 lbs. per square inch.

7. *Sampling.*—For each lot of two hundred one extra hose shall be furnished free of cost.

8. III. SIZE AND DIMENSIONS.

Length—	Air-brake Hose, Inches.	Air-Signal Hose, Inches.
Maximum	22½	22½
Minimum	22	22

III. SIZE AND DIMENSIONS—Continued.

	Air-brake Hose, Inches.	Air-Signal Hose, Inches.
Outside diameter—		
Maximum	2 1/8	1 7/8
Minimum	2	1 13/16
Inside diameter—		
Maximum	1 1/16	1 1/16
Minimum	1 5/8	1 1/8
Thickness of cap vulcanized on—		
Maximum	1/4	1/4
Minimum	3/32	3/32

9. Hose shall be smooth and regular in size throughout its entire length.

IV. WORKMANSHIP.

10. *Tube.*—The tube shall be made either by hand or machine. It shall be free from holes and imperfections, and in joining must be so firmly united to the cotton fabric that it can not be separated without breaking or splitting the tube. The tube shall be of such a composition and so cured as to successfully meet the requirements of the tests given in Section 6 and 7, the tubes to be not less than 5/32 in. thick at any point.

11. *Wrapping.*—The canvas or woven fabric used as a wrapping for the hose is to be made of long-fiber cotton, loosely woven, from 38 to 40 inches in width, and to weigh not less than 20 to 22 ounces per yard, respectively, this to be determined by the following number of threads to the inch:

Warp .....25 threads per inch.
Filler .....18 threads per inch.

Tensile strength of single threads:

Warp .....not under 12 pounds.
Filler .....not under 9 pounds.

The wrapping shall be frictioned on both sides, and shall have in addition a distinct coating or layer of gum between each ply of wrappings. The canvas wrapping shall be applied on the bias and edges lapped at least ½ in. Woven or braided covering should be loose in texture, so that the rubber on either side will be firmly united.

12. *Cover.*—The cover shall be of the same quality of gum as the tube and shall not be less than 1/16 in. thick.

V. MARKING.

13. *Serial Number.*—Each lot of two hundred or less must bear the manufacturer's serial number, commencing at "1" on the first of the year and continuing consecutively until the end of the year.

14. *Label.*—Each length of hose shall have vulcanized on it the label for air-brake hose of red or white rubber as shown under the specifications for "Label for Air-brake Hose."

VI. INSPECTION.

15. *Rejection.*—If the test hose fails to meet the required test, the lot from which it was taken may be rejected without further examination and returned to the manufacturer.

16. *Inspection.*—Inspection shall be made at destination. If the test hose is satisfactory, the entire lot will be examined and those complying with the specifications will be accepted.

17. *Freight Charges.*—Rejected material will be returned to the manufacturer, who shall pay freight charges both ways.

TABLE SHOWING DIFFERENCES BETWEEN PRESENT STANDARD AND PROPOSED SPECIFICATIONS.

	Present M. C. B.	Proposed.
1. Number of ply..	Not less than two nor more than four.	Not less than four.
2. Porosity test....	Not required.	See Paragraph 2.
3. Hydrostatic test..	100 pounds pressure, with not more than ¼ in. expansion of diameter.	200 pounds pressure with not more than increase of ¾ in. in circumference.
4. Bursting test.....	400 pounds pressure (water) for ten minutes without bursting.	500 pounds pressure (water) for ten minutes without bursting.
5. Friction test.....	20 pounds to unwind not more than 8 in. in ten minutes.	Same requirement.
6. Stretching test...	Tube and Cover 2 in. marks to stretch to 8 in., released, remarked and new 2 in. stretched to 8 in. Held for ten minutes, released, and ten minutes afterward to have a permanent set of not over ¼ in. Strip not to break.	Same test, except that 2 in. marks must stretch to 10 in. Finally, initial set must be not over ¼ in. and the final set (after resting ten minutes) not over ⅛ in.
7. Tensile strength..	No requirement.	Speed of machine 20 in. per minute. After elongation of 2 in. to 12 in. the inner tube must have a tensile strength between 800 and 1,200 pounds per sq. in. and the cover between 700 and 1,100 pounds per sq. in.
8. Sizes:	Length 21¾ to 22¼ in.	22 to 22½ in.
Outside diameter.	Not over 2⅛ in.	2 1/16 to 2⅛ in.
Inside diameter...	1⅝ in. to 1 7/16 in.	Same.
Thickness of cap.	Swelled ends, 1/16 to ⅛ in.	Same diam. throughout, 1-32 to 3-32 in.
9. Tube	Hand-made of three calendars of rubber, thickness 3/32 in. min.	Hand or machine-made. Same.
10. Wrapping	Loosely woven cotton, 38 in. wide, wt. 20 oz. per yd.; 40 in. wide, wt. 22 oz. per yd.	Same, also cotton to have specified number of threads to inch in warp and filler, and of a required tensile strength for each thread.
	No requirement as to sewing edges or to lap the same.	Edges of fabric to overlap ½ in.
11. Cover	Same quality as inner tube.	Same.
12. Inspection		Inspection to be made at destination.

The report is signed by:—M. K. Barnum, chairman; T. H. Goodnow (C. & N. W.); I. S. Downing (L. S. & M. S.); C. D. Young (P. R. R.); A. J. Cota (C. B. & Q.), and J. R. Onderdonk (B. & O.).

M. K. Barnum, in presenting the report, said: The committee has held a number of meetings and has invited the manufacturers to present their views, in the first place in writing, and later on in conference with the committee, and we have simply given you the net result of our work and have not encumbered our report with details which can be obtained from the secretary if anyone wishes them. The report should be divided into parts and acted upon under two heads, one covering the proposed new label and the other the specifications.

You will remember that the Train Brake and Signal Equipment committee had a report on the hose label, and the action on that report was deferred until the report of this committee. I would suggest that separate action be taken on the air hose label, and that afterwards the specifications be acted upon by the convention by themselves.

DISCUSSION.

M. K. Barnum (Ill. Cent.): We have here a sample piece of hose with the proposed new label, which might be passed around.

T. H. Goodnow (C. & N. W.): If the action of the association is favorable to the proposed label here, I would suggest that with the approval of the executive committee, the Secretary be instructed to send out at once a circular notifying the companies of this label, as this will not be distributed until the proceedings are, so that the purchasing departments will be advised, and can eliminate the present two labels.

Secretary Taylor: The result of the letter ballot will show whether it is adopted or not. Still, if it is desirable, I can send out a special letter on this subject.

F. F. Gaines, (C. of Ga.); I would like to know when this new badge will be adopted, and whether we will be penalized if it is not adopted on time.

M. K. Barnum: I do not recall just what action was taken on that, but the arbitration committee discussed it and intended to allow until October 1, 1915, before making the new badge a requirement for the hose, so that gives everybody a chance to use up the old hose.

C. A. Schroyer (C. & N. W.): I see a joker in this, and do not know whether it was intended so by the committee or not. You have not forgotten the troubles with the present label, and the thousands of hose thrown out for the slight variation. Now, there is a higher grade of rubber to be used in this hose, and if this label carries, which I hope it will, the question is whether we are to sit in this convention hall and vote whether all hose after a certain date without this label is not M. C. B. hose. It is not M. C. B. because it has not as high a stretching quality. There is a copyright in it. There is nothing to be said as to whether the manufacturer is to charge anything for that; but it was intimated to me that there would be an advance in the price of this hose as they had to use this copyright. I am heartily in favor of this new brand, but I hope we will not have to go through the same thing that we have had for the last few years with our present brand. This new brand will mean an advance of three or four cents.

M. K. Barnum.—If there is any joker in the report, the committee has not discovered it. As far as the use of the copyright of badge is concerned, it was to protect the association against unauthorized persons using it. There will be no charge for its use; the copyright will belong to the association.

C. A. Schroyer.—Will the manufacturer get the right to use it; how will he get it?

M. K. Barnum.—By the order which he receives for hose from people who have a right to use it.

C. A. Schroyer.—Will there be a penalty if the method of manufacture is not followed?

D. F. Crawford.—In view of the conversation which has taken place on this subject of the label, I would suggest that the secretary send out a special ballot covering this one item alone, and send it out as quickly as he can. The result is to be announced immediately after the thirty days' time in which to vote. If sent out next week, we would have this ballot from the association considerably in advance of the regular letter ballot which does not come until September or October.

C. A. Schroyer.—That refers to the label only?

D. F. Crawford.—Yes.

The motion was seconded and carried.

President Fuller: We will now take up the second part of the report.

F. F. Gaines: Inasmuch as the committee has asked to be continued for another year, and they are not ready at this time to fully outline the specifications, I move that they be continued and suggest that in the meantime as many as can shall buy hose under this proposed specification and try it out so that we may see what results we get as far as possible.

M. K. Barnum: It has been the idea of the committee that their specification as drawn up here should be ready for adoption in place of the 1905 specifications now in use. It is a generally accepted fact that the 1905 specifications are not giving a satisfactory hose. The committee found that the average life of the hose purchased under these specifications was about ten months, and would recommend that the new specifications be adopted in place of the 1905 specifications, or at least be presented to letter ballot for adoption in place of them.

F. F. Gaines: I would be very glad to withdraw my original motion on that explanation. However, it is a fact, as I understand from the committee, that they have further refinements on this specification in view, and I thought that we did not want a new specification this year and then perhaps another new one next year.

C. A. Schroyer: We are requiring a hose that is parallel on its inside diameter, and as the result, it is costing us six or seven cents a hose more than if it was made 1-¼ in. inside diameter, with expanding ends. There is no benefit obtained in any respect in the use of a hose that is made parallel. There is not a fraction of a cent increased cost in making it 1-¼ in. diameter with an expanded end, and I do not think there is any need for the members of this association to pay an increased price for this hose simply because it has an increased diameter over what is required.

M. K. Barnum.—We have assurances from the manufacturers that it will not increase the cost of the hose to have it straight, and there seems to be some advantage in having it straight in the mounting and service.

C. A. Schroyer.—The manufacturers tell me that it is not reasonable to expect that they will make a hose 3-16 in. larger than the hose made heretofore and, make it at the same price as the smaller hose. It takes that much more material to do the work, and it is the material and labor in making the hose that costs the money. If any of you can show me a reason why the larger hose should be furnished at the same price as the smaller one would be, unless it is a matter of saving in labor, which it is not, then I would be willing to take into consideration that claim of the manufacturers that no additional charge would be made; otherwise, I cannot see it.

J. R. Onderdonk (B. & O.): The present M. C. B. specifications for air brake hose call for the same diameter as the proposed specifications, so that I do not see that the 1-¼ in. has anything to do with this specification over the present standard. If we expand the 1⅜ in. hose at the present time, this specification makes no increase in price.

C. D. Young (Penna. Lines): I believe that the present standard of the association is a straight hose. It was agreed in the committee that we should continue that as a standard. I think there is a difference in the fabrication of hose, whether made with expanded ends or not. In practice, when the former M. C. B. standard hose had the expanded end, it was the custom of some manufacturers to vulcanize the hose after the expansion and then to wrap it. In so doing, it was practically impossible to wrap the canvas smoothly over the two diameters, one diameter at the swelled end, and the normal diameter over the balance of the length of the hose. It was also found difficult to wrap one piece of cloth over the hose; the cloth puckers at the point where the diameter changes.

Examination of a large number of pieces of hose will develop the fact that we practically have no protection at the point of curvature between the two diameters, and from a construction and manufacturing standpoint there is quite a decided advantage in being able to wrap a straight tube rather than one of two diameters. I think the committee's recommendation to continue the present standard of straight hose is entirely satisfactory. I am quite sure, from what the manufacturers told us in confidence, that they feel the same way. If anybody is at this time buying the expanded end hose, they are buying hose which is not standard under the present M. C. B. practice, as I understand it.

In reply to Mr. Gaines, I would explain that the investigation which the committee is making is along the line of adding additional requirements to our specifications and practices, making some slight modifications in the requirements. We are also providing, in case the association wants it, lettered air-brake hose. The tests are directed largely to accumulating data with a view of getting a life test on hose in order to determine how fast it deteriorates, and the rate of deterioration from the time it is new until it is worn out. These experiments are being carried on in the laboratories of several railroads which are represented on the committee, as well as on the cars. It will take some three or four years (if the hose lasts that long, as the manufacturers tell us it will) for us to get the results of the investigation, which is rather elaborate and will take a good deal of work. I think it would be a great mistake, if the Association desires better air brake hose, to postpone sending this specification to letter ballot.

D. F. Crawford: I move that the recommendations of the committee on specifications for Air Brake Hose be referred to letter ballot for adoption as the standard of this ossociation, in place of the one they now have.

C. A. Schroyer: I would like to have the courtesy of the floor extended to any manufacturers of air-brake hose who may be here and who will kindly advise us what difference there may be in the cost of the larger hose and the hose with the expanded end. Let us have it direct from them.

President Fuller: The expanded end is not in the question.

M. K. Barnum: I would move, if there are representatives of the manufacturers of air-brake hose here, that the courtesy of the floor be extended to them to give such information and present such remarks as they desire. The motion was seconded and carried. No representative of the air-brake hose manufacturers responded.

Mr. Crawford's motion was then put to vote and carried.

President Fuller: The committee on Air Brake Hose Specifications have a supplemental report which they wish to present.

M. K. Barnum: This report covers the air-hose gaskets which we thought would be so closely allied to the hose that it would be well to cover that also; and as the suggested specifications are short, I will read them: "Dimensions of gaskets: The dimensions of the gaskets must agree with those adopted by the M. C. B. Convention of 1909, and all gaskets shipped must be uniform in size and section."

Material desired: Gaskets ordered under this specification should be made of such a compound that they will be tough, and yet have enough elasticity to conform to the requirements for strength and elongation. They should sustain an ultimate load of 100 lbs., and show an elongation of original internal diameter of 350 per cent. when tested as described below.

Testing: When the samples for test are received, they will be examined for size and workmanship. The gaskets will be tested in tension in a manner similar to that of the tensile test of a single link of a chain. The half-links used to pull on the gasket will each be provided with a 180-deg. fillet of the same diameter as the original inner diameter of the gasket—that is, the two semi-circular fillets of the pulling links will just fill the inside of the gasket.

Rejection Limits: If any of the sample gaskets representing a lot should fail under a load of less than 90 lbs., or if the elongation is less than 250 per cent., the entire lot represented by the sample will be rejected. If the tensile strength of any sample tested is more than 125 lbs., the lot will be rejected, unless the elongation obtained from such samples is more than 350 per cent. If the dimensions vary more than 1-64 in. in any way from those adopted as standards, the entire lot will be rejected."

I suggest that in taking action on the recommendations of the committee in this supplemental report, it be sent to letter ballot with the other, and voted on separately; that would be three items to be voted on by special letter ballot.

F. F. Gaines: I presume that in case a letter ballot is favorable, the gasket will be included with the other two items. You would not have a separate specification for the gasket?

Secretary Taylor: I understand Mr. Barnum's motion to be that the special letter ballot shall include specifications for the label and the gasket. There will be three separate questions on which to vote.

F. F. Gaines: But suppose the three are adopted by letter ballot, is the separate specification for hoist gaskets to be joined with the others?

M. K. Barnum: It will be a separate specification and can be used separately or with the other.

F. F. Gaines: I would like to suggest that the committee, before they finally determine whether it is to be submitted as a separate question for letter ballot vote, whether we can have it made so that you can use them separately, or must they be together?

Secretary Taylor: It will be separated in the Standards, Mr. Gaines.

The motion was seconded and carried.

REVISION OF FORM OF PRESENT SPECIFICATIONS.

The committee has reviewed the existing M. C. B. specifications with a view of harmonizing the form without any change in substance, and, in order to accomplish this, an outline of instructions was prepared to guide the committee in its work. The subject matter of the outline was largely obtained from the existing standard of the committee on style of the American Society for Testing Materials.

After rewording the specifications, they were submitted to the various chairmen interested in the subjects for approval, which was obtained. The committee therefore recommends the following:

That the instructions covering the form of specifications be adopted by the association for future committees in preparing specifications.

That the specifications for iron axles be discontinued from the standards of the association, as material of this kind is no longer purchased in any quantity.

It was found in rewording the specifications that there are certain items in the rejection limits which could, to advantage, be corrected, and the committee recommends that a committee be appointed to review these specifications in order to bring them up to present-day practice. This refers especially to specifications covering steel axles.

Specifications do not exist for the following classes of material which are largely used by the members of the association, and we would recommend that consideration be given to the drafting of specifications covering this material for the use of the members:

Structural steel for passenger and freight cars.
Steel plate for passenger and freight cars.
Carbon-steel forgings for passenger and freight cars.
Rivet steel for passenger and freight cars.
Blooms and billets for forgings for passenger and freight cars.
Steel castings for passenger and freight cars.
Malleable castings for passenger and freight cars.
Mild-steel bars for passenger and freight cars, for miscellaneous parts such as bolts, handholds, step treads, etc.
Refined merchant bar iron for passenger and freight cars.
Journal-box brasses for passenger and freight cars.
Insulating properties of refrigerator cars.
Hard-drawn copper wire.
Medium-hard-drawn copper wire.
Soft and annealed copper wire.
Paint for freight equipment cars.
Pipe for passenger and freight cars.
Galvanized sheets for passenger and freight cars.
Chain for passenger and freight cars.
Spring steel for passenger and freight cars.
Journal-box packing for passenger and freight cars.
Heat-treated knuckle pivot pins.

The work of this committee convinces it that there is a large amount of work which can be done by such a committee as this in assisting various committees on material in formulating their specifications, and recommend that this committee be continued, either as a standing committee or a special committee, but, if it is made a standing committee, would recommend that the secretary of the association be made the permanent chairman.

The report is signed by:—C. D. Young (Penna.), chairman; J. W. Taylor, secretary, and J. S. Sheafe (Ill. Cent.).

DISCUSSION.

D. F. Crawford: My understanding is that the report does not change the substance, but the form only; and I therefore move that the report be received and approved, and that the secretary be instructed in printing our specifications, to embody the suggestions of this committee.

The motion was seconded.

C. F. Giles (L. & N.): It would be dangerous to eliminate the specifications for iron axles. We may not use many iron axles, but we are manufacturing them in an axle forge ourselves to some extent, and if we eliminate those specifications we are likely to get into trouble by reason of some broken axle coming up in connection with a lawsuit. If we condemn the iron axle we will put ammunition into the hands of someone else. On the first page of this report, it says: "That the specifications for iron axles be discontinued from the standards of the association, as material of this kind is no longer purchased in any quantity."

President Fuller: Mr. Crawford's motion was to confine the results of this report to changes in accordance with the provision of this report, and not to eliminate any standards.

D. F. Crawford: Yes, as I understand it, to eliminate a standard it would have to go to letter ballot.

Secretary Taylor: Yes.

D. F. Crawford: I would like to add to my motion that the other subject requiring such consideration be referred to the executive committee.

The motion was carried.

CAR CONSTRUCTION.

MINIMUM CENTER SILL STRENGTH, TO RESIST END STRAINS, FOR STEEL AND STEEL UNDERFRAME CARS.

Part of a letter from D. F. Crawford, general superintendent motive power, Pennsylvania Lines West, outlines the reasons for this investigation as follows:

"Prior to the 1911 M. C. B. code, all steel underframe and all steel cars were subjected to the same combinations and the same delivering lines' defects as wooden underframe, composite underframe and all wooden cars. The consequences were that, in interchange, defect cards were being requested for damage which in no event would be repaired. In order to correct this situation Rule 43 was introduced. The interpretation of this rule is, in effect, that a steel underframe car or an all-steel car will not be damaged in fair usage; consequently, the combinations should not apply, and the handling company was made responsible for all damage which necessitated repair, except such damage as might occur through corrosion and weakening of the parts.

"I have been advised that, in some of the new all-steel and steel underframe equipment constructed recently, the center sill section has been reduced to such an extent that the steel and steel underframe cars are no stronger, if as strong, as the wooden cars, and under Rule 43 the owner will receive the same protection as he would if the car had been of proper strength."

The subject has been divided in two parts:

(a) Center sills for existing cars.

(b) Center sills for new cars.

The only precedent we have is that of wooden cars. The experience with steel and steel underframe cars extends over a period of about fifteen years. This experience covers a large number of car types, showing great variations in end strain resisting qualities.

It was agreed that the relative values of steel and wood used in car construction for direct tension or compression should be based on the elastic limits of these materials, and that the committee use a ratio of four for the elastic limit of steel to that of oak or yellow pine.

Compared with a wooden car having two 4-in. by 8-in. center sills, an equivalent steel car must have an effective center sill area of not less than 16 square inches between the points where end strain takes effect. The strains in car underframes due to lading do not add greatly to the stresses from end shocks. As a rule, a loaded car is less liable to damage from end strains than an empty car, for which reason it will not be necessary to introduce load strains, but base the minimum area and end-resisting strength on end strains only.

Modern steel cars have the center line of draft at varying distances below (seldom above) the horizontal neutral axis of the center sills, and draft stops riveted to the center sills. The distance between the neutral axis of any member of the car and the center line of strain acts as a lever arm, through which bending effect is added to direct tension or compression. Strains which do not act in line with the neutral axis of car members will be designated "Eccentric Strains." The ratio of stress to strain is $\frac{1}{A} + \frac{X}{SM}$, in which

A represents the area, in square inches.

X represents the lever arm, in inches.

SM represents section modulus of the section.

Center sills not properly tied together at rear draft stops, located at some distance from the bolster, are subject to eccentric strains, which have a tendency to deflect them outward or away from the center line of car between the draft stops and bolster.

Compression strains acting on the car through the draft gear, or car ends, as the case may be, create strut action in the members of the car framing. Long struts are liable to buckle under compression, for which reason it is customary to set limits for ratio of length to radius of gyration of struts, in order to restrict the excess stress caused by this buckling tendency. The members, or parts of members, of a car framing which require consideration are generally flanges of channels or I-beams, and plates. Their cross sections are rectangular, or sufficiently close

to rectangular to be so considered in order to avoid theoretical computations.

The committee recommends the adoption of a ratio of 70 for length to radius of gyration, which corresponds closely with a ratio of 20 for length to depth "d" of a rectangular section. This depth must be measured in the direction in which buckling may take place.

To fulfill the restrictions just given, the length of a member should not be greater than 20 d., or the member must be securely anchored at intervals not exceeding 20 d.

The anchorage of center sills may be accomplished in various ways, the more common methods being by means of cover plates, or diagonal braces. The value of such braces increases the value of the center sills. Cover plates add direct value, and diagonal braces add partial value, depending on their angularity. Braces at right angles to the center sills add no value to the center sill area, unless specifically designed as horizontal girders of sufficient strength to transfer all of the end strains from the draft to the side framing, in which case the side framing must perform the functions of center sills, and must be subject to the same rules. The value of braces at point of minimum strength may be added to the center sill area, taking effect in the horizontal plane in which such value lies.

RECOMMENDATIONS.

Existing Steel or Steel Underframe Cars, which have less strength than that specified below, should be classified with wooden cars, and subject to the same rules for combination defects:

Area of center sills not less than 16 square inches.

Ratio of stress to end strain not more than 0.09.

The length of center or draft sill members, or part of member between braces, to be not more than 20 d. where "d" is the depth of the member, measured in the direction in which buckling might take place.

For new cars to be built after 1913 a greater strength should be required. Transportation requirements have increased greatly in the past ten years. Heavy freight locomotives, including Mallet road engines, greater efforts to pass cars through yards quickly, and rougher handling of cars, have increased the strains to cars, due to end shock, at least 50 per cent. Manufacturers of couplers, draft gears, draft attachments, etc., are all busy increasing the strength of their specialties, and are generally aiming to obtain double the original strength.

For new cars the area of center sills should not be less than 24 square inches.

Ratio of stress to end strain, not more than 0.06.

The length of center or draft sill members, or part of member between braces, to be not more than 20 d. where "d" is the depth of the member, measured in the direction in which buckling might take place.

BOX CAR END DESIGN AND STRENGTH.

F. F. Gaines suggested to the M. C. B. Association that designs of end framing of box cars, to prevent damage to car by shifting load, be submitted.

An investigation of box car repairs leads to a realization of the ever-increasing damage to box car ends and consequent expense of repairs. Wooden ends without metal reinforcement no longer meet transportation requirements; therefore, metal ends and metal reinforcements have been applied, tested and found much superior to wooden ends. Metal ends can be used either with or without wood lining. When using metal ends without wood lining, the inside surface of the plate must have no projections, such as bolt or rivet heads. Colonel B. W. Dunn, under date of March 21, 1913, advised as follows: "Paragraph 1662 (f), I. C. C. Regulations, prescribes that in a freight car to carry dangerous explosives, special care must be taken 'to have no projecting nails or bolts or exposed pieces of metal which may work loose or produce holes in packages of explosives during transit.' It is hoped, therefore, that you will be able to arrange the design so that the rivet heads will not project. If there is to be no interior wooden lining, and projection of the rivets can not be avoided, it would seem that the federal regulations would require a special wooden lining to be placed in the end of a car of this kind at least as high as the lading

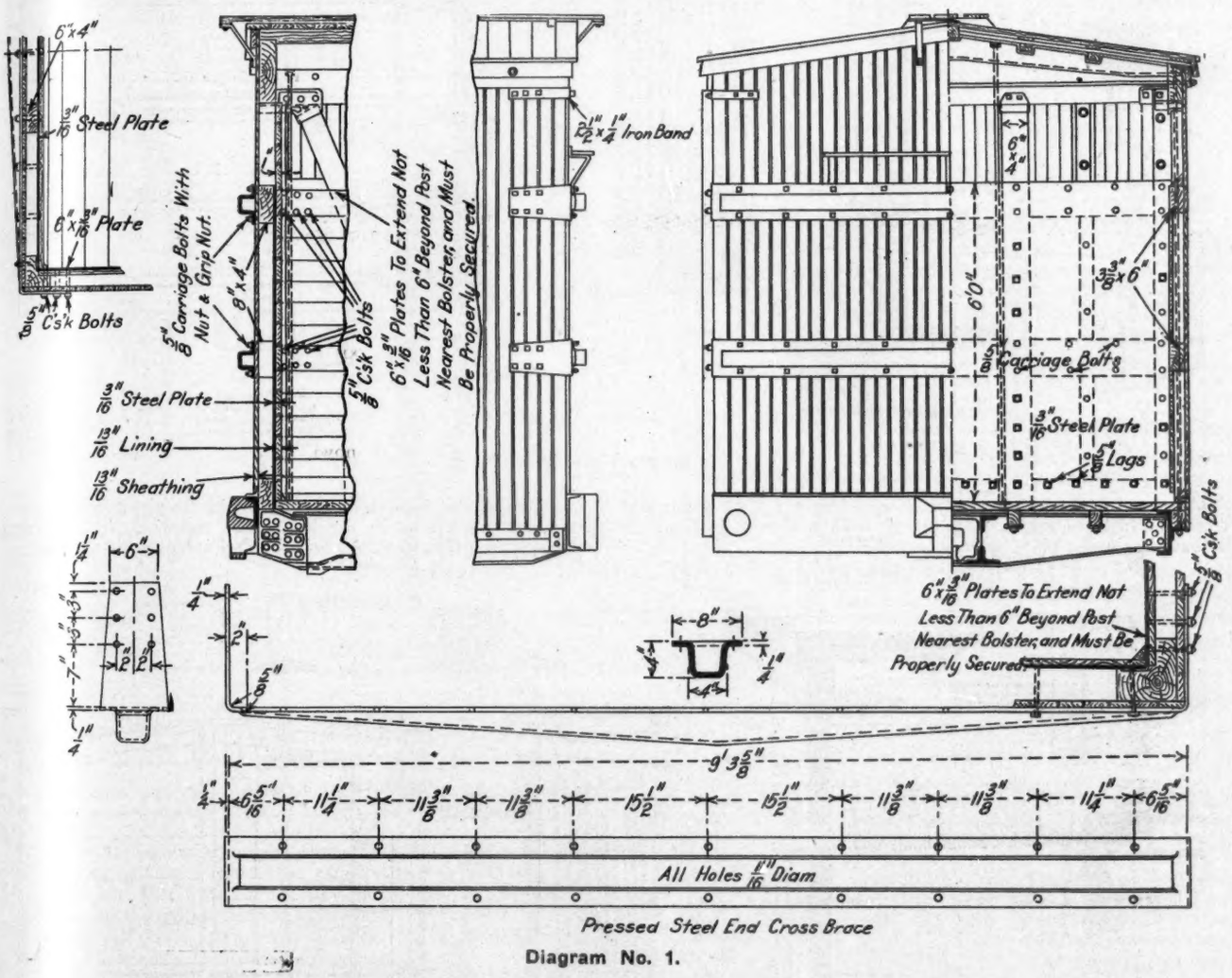


Diagram No. 1.

of explosive packages. I do not interpret the federal regulations to forbid the presence of flat metal surfaces, such as this reinforcing plate would be, if the rivet heads did not project."

RECOMMENDATIONS.

(a) Wooden cars with standard M. C. B. lining should have the ends reinforced with metal construction in accord with Diagram 1, or its equivalent.

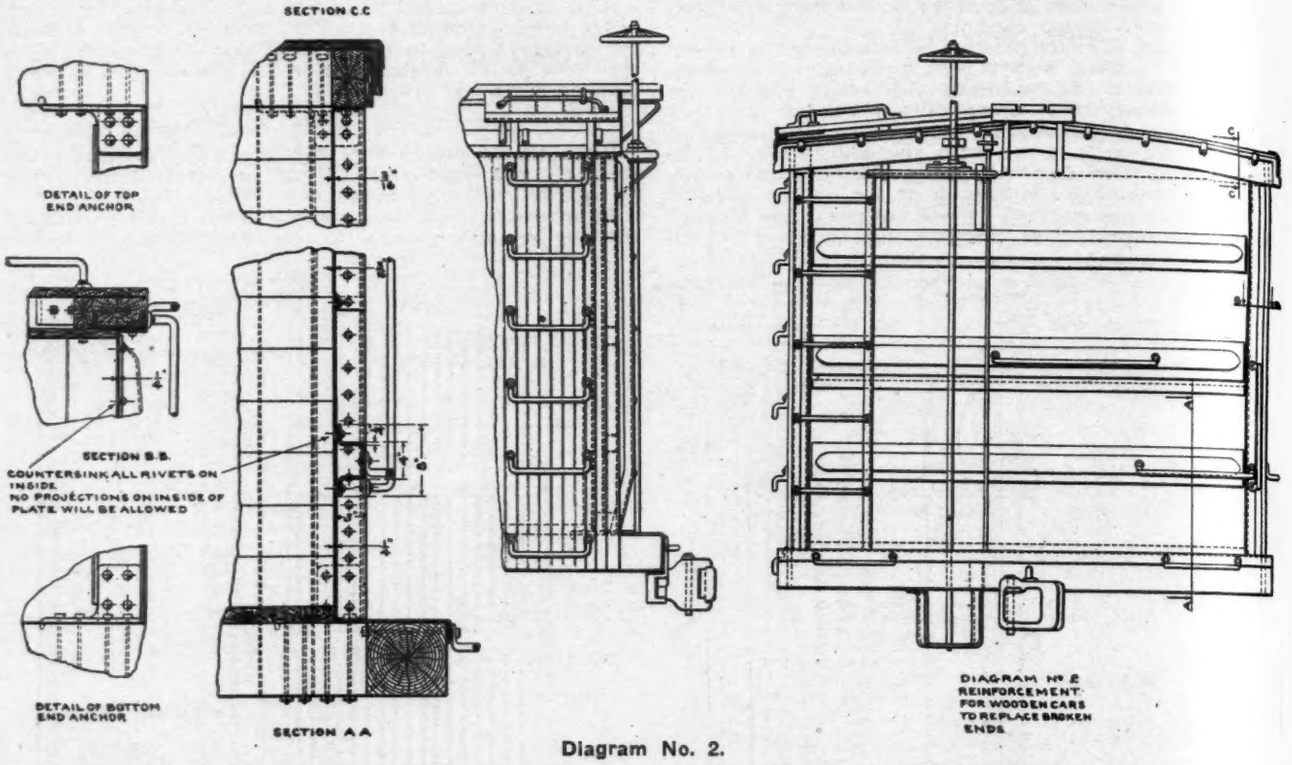

SECTION C.C
DETAIL OF TOP END ANCHOR
SECTION B.B.
COUNTERSINK ALL RIVETS ON INSIDE.
NO PROJECTIONS ON INSIDE OF PLATE WILL BE ALLOWED
DETAIL OF BOTTOM END ANCHOR
SECTION A A
DIAGRAM Nº 2
REINFORCEMENT FOR WOODEN CARS TO REPLACE BROKEN ENDS

Diagram No. 2.

(b) Steel underframe cars with end lining 1½ in. thick and over should be equipped with outside braces, shown on Diagram 1, but the inside plate may be omitted.

(e) Each end must be attached to the longitudinal car members, either directly or through other members, by fastenings sufficient in strength to develop the full strength of the end.

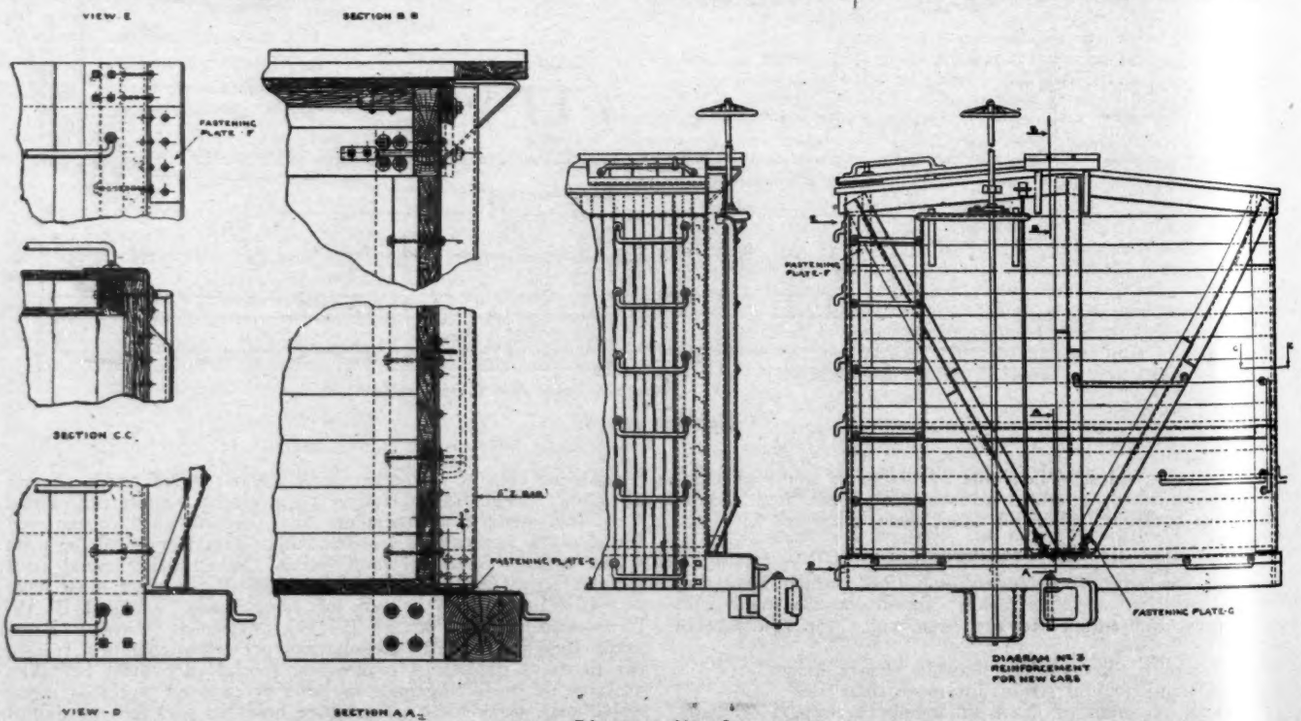


Diagram No. 3.

NOTE.—In applying outside braces, due regard must be given to compliance with United States Safety Appliance Rules for coupler and end ladder clearances.

(c) Cars with wood superstructure, requiring complete renewal of ends, should have steel ends applied, in accord with Diagram 2, or its equivalent.

(d) New cars should be equipped with ends of the type shown on Diagrams 3 and 4. The section modulus of the posts and braces, 2 feet above floor line, not including corner posts or flat end plate, should not be less than 15.

NOTE.—The Murphy or Van Dorn steel ends can be used instead of those shown on Diagrams 1, 2, 3 and 4.

(f) The construction shown in the diagrams are equally applicable to outside end sill cars as well as to inside end sill cars by modifying the attachment at bottom to suit the design of the end sill.

Seal Records of Box Car End Doors.

The following from Geo. A. Hancock, general superintendent motive power of the St. Louis & San Francisco originated this investigation:

"Much difficulty is experienced in having yard clerks obtain accurate seal records of end doors, on account of the inconvenient location and risk of personal injury. Claims are now being paid on account of no end door seal record, and cars are being pilfered by theft through the end doors, which can be entered with the least chance for detection. Is an end door in a standard box car essential? If so, could it not be placed near the side of car where seals could be read from the side ladder?

"It brought out the discussion that an end door is desirable for loading certain classes of lumber, and that in a shipment of lumber there sometimes are specially designed pieces that are too long to go into the side door, and that have to go in at the end door, so the agents have referred the matter to this office with request that we advise: (1) If it is essential to have end doors in box cars; (2) if end doors are necessary, if they can not be located where the seals can be read with less danger of personal injury than at present; (3) if some standard location can not be adopted so that all will be alike; (4) if the vertical height of the end door could not be made standard and door so designed that it could not be entered by a person intent on robbing the car, even though door was not sealed.

"As we are not putting end doors in our modern box cars, but as they are being placed in cars built by other companies, I believe that this is a matter that should be handled by the Committee on Standards and Recommended Practices, in connection with reports they made in 1912 on the height of seals on side doors."

Both kinds of cars, those with and those without end doors, used for the purpose of loading lumber, have been common in years past, but each year fewer new cars with end doors are built, because the end doors are valuable only on roads handling long lumber directly from the lumber regions as an important feature of traffic. Roads which formerly equipped all box cars with end doors have eliminated them from new cars, and are permanently fastening them in place on some of their old cars, leaving the end doors operative only on short box cars. This indicates that with the advent of the 40-foot box car the end doors will gradually become obsolete.

RECOMMENDATIONS.

(a) End doors used for loading lumber in box cars are essential only on roads having long lumber loading in box cars as an essential feature of traffic.

(b) End doors must be so constructed that when closed they lock automatically, by means of a lock accessible only from the inside of the car, thus avoiding the necessity of taking seal records.

(c) Seal appliances now in use, and not accessible from the ground or from end ladders, should be revised to be so accessible to promote the safety of employees.

The report is signed by:—W. F. Kiesel, Jr. (P. R. R.) chairman); C. A. Seley; A. R. Ayers (N. Y. C. Lines); S. G. Thomson (P. & R.), and C. E. Fuller (U. P.).

DISCUSSION.

R. E. Smith (Atlantic Coast Line): Has the committee in their recommendations overlooked a very common class of cars, used largely and primarily for perishable fruit and vegetables? These cars are necessarily equipped with end doors for ventilation of the lading, both top and bottom; they are provided with means for closing the solid door and also for applying seals when the end door is closed. It is important at one stage of the journey that the end door be opened to provide ventilation, and another stage, particularly in the case of citrus fruits moving from Florida to northern points, that the doors be closed and made as nearly frost-proof as possible with that class of car; from the standpoint of the southern lines I do not see how we could accept this recommendation. It would not be possible to so arrange the door that it could be locked automatically on the inside, for the reason I have stated, that the doors must be opened and closed en route according to the severity of the weather.

I ask if when the committee made this recommendation, they had in mind exactly what they say: "End doors used for loading lumber in box cars are essential only on roads having long lumber loaded in box cars as an essential feature of traffic," or whether they refer to all box cars with end doors.

W. F. Kiesel, Jr. (Penna.): The committee had in mind only the small doors used in the ends of cars in which lumber is loaded. It is the common practice, to put ventilators in the ends of cars in such a manner that no one can enter the car. There may be some old cars, with which we are not acquainted, in which the ventilators are of such construction that you can enter the car from the end door, but all of the recent cars built have the end doors put in solidly, so that they cannot be removed.

R. E. Smith: I will support what Mr. Kiesel has said in respect to modern cars. Certainly this end door construction in cars of modern type is of a very substantial nature, and the car cannot be entered or pilfered through means of the end door; and the older cars, of which we have still a considerable number, cannot normally be entered for the purposes of pilfering. But people who load these cars with long lumber have been ingenious enough to butt out the ventilating appliances

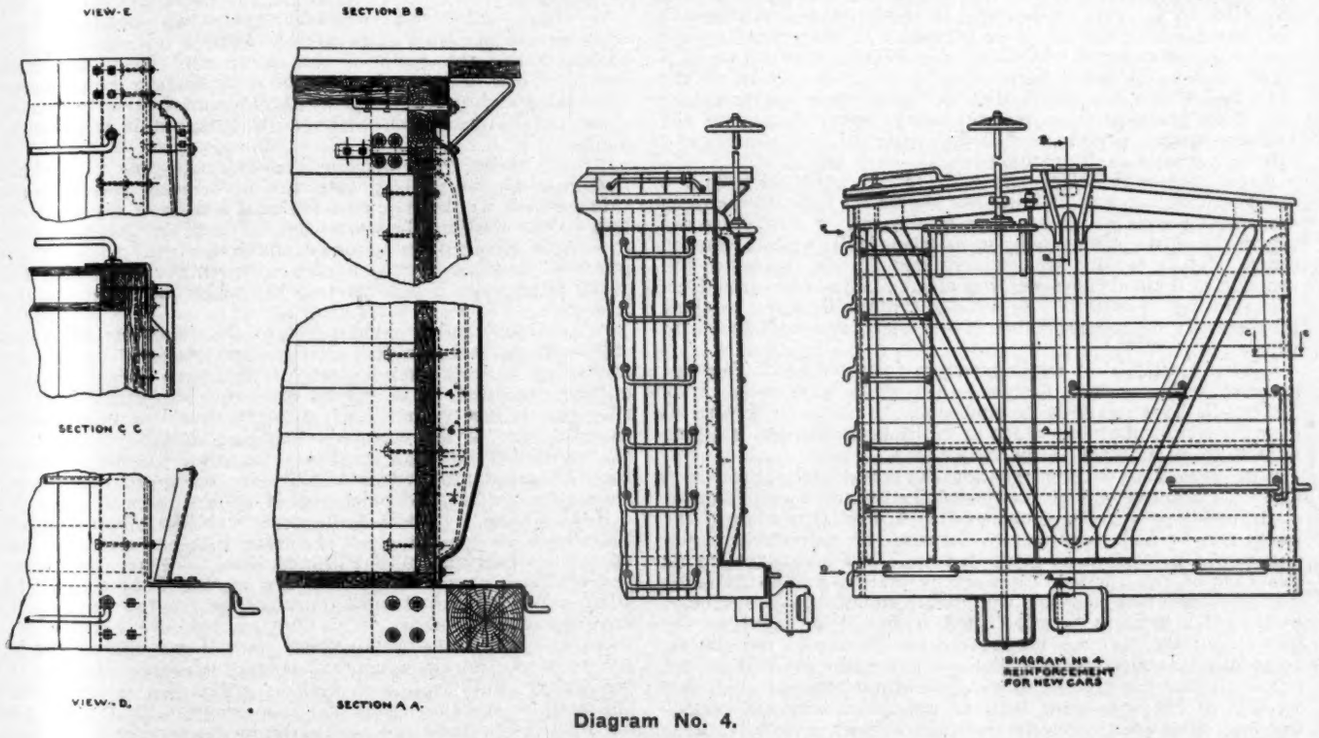


Diagram No. 4.

with their lumber and have failed to replace them. A thief who is properly equipped, can take out the end ventilators to get into the car, so that Mr. Kiesel is entirely right about that feature. The modern car cannot be entered for the purpose of pilfering. The pilfering of vegetable cars takes place principally from the side ventilator door and not the end ventilator door.

R. W. Burnett, (C. P.): The recommendations of this report are so far-reaching they should receive careful consideration. The company that I represent strongly objects to being forced to a standard which would mean a heavy increase in cost and weight, which experience has proved unnecessary. It is manifestly unnecessary to go back fifteen years, to make comparisons with wooden cars, considering that we have had 15 years' experience with steel cars. The comparison between steel and wooden cars is based upon the compressive strength of wood. The fact is that wooden sills fail from splitting or bending and from bending only when not properly supported, and practically never from compressive strength alone.

We have record of cars with 15 in. centre sills with an area of less than 20 in. being undamaged in accidents, while adjoining cars with centre sills of over 30 in. have collapsed at the bolster, due to the fact that the 15 in. sill was supported and the heavier sill was not supported.

There are many cars with 12 in. centre sills which have given excellent service for many years, from the fact that the sills have been supported. I think it is a mistake to use one formula for all class of cars. Within recent years we have had experience with steel superstructure cars which have shown the advantage of supporting the ends of the sills, and which has enabled us to use a much lighter centre sill, with practically no failure; where other cars with the heavier centre sills have failed, owing to the centre sills not being supported at the ends.

Experience with 20,000 cars with 15 in. centre sills, with a cross-sectional area of 19.8 in., has shown no failures except in demolishing wrecks. These cars at the end of five years are practically in the same condition as when built, while a wooden centre sill car rapidly deteriorates from the day it is put into use, due to the bolt holes wearing oblong, bolts bending, and the sills splitting. I mention the wooden centre sills again to show the necessity of comparing steel with steel, and not steel with wood.

Why not establish a minimum from facts obtained from experience with carefully designed cars where cars with 15 in. center sills have run in large numbers in the heaviest service all over the continent and in which carefully kept records for a long time show no failures of the centre sills.

With regard to recommendations (a) and (b), I feel that this association cannot give consideration to the contention that a car built last year be considered as a steel car, while a car which may be built next year of the same or superior construction would be classed as a wooden car. My understanding of this part of the committee's work is that it was to establish the difference between fair and unfair usage. If a minimum centre sill area is to be established, it should be based on the strength of the car, and not on the age. I would recommend as a substitute for recommendations (a) and (b), that in the future all cars constructed should have a minimum area of centre sills of 18 in. between bolsters and 20 in. between bolsters and end sills, when properly tied and supported, and a corresponding formula used when necessary to take care of eccentric loading; and after October 1, 1914, all cars with centre sills of less than these dimensions should be considered as wooden cars, regardless of when they were built.

F. F. Gaines: I cannot agree with Mr. Burnett in his remarks on the centre sill section. I have had some experience with cars with these light centre sills, and the experience has been especially disastrous. I do not think there is any question that in the building of steel cars in days gone by we have used too light material and that there was not sufficient strength in the car to take care of the buffing shocks. In my opinion, it is time that this association went on record as favoring good substantial car construction, and I would therefore move that recommendation (b), relative to new equipment, be submitted to letter ballot for adoption as recommended practice, and also that recommendations (a), (b), (c), (d), (e) and (f), under end construction, be separately submitted to letter ballot for adoption as recommended practice.

The end construction of box cars is something that has been neglected in the past to a very considerable extent, and I know from looking over our repair tracks that not only our own cars, but other cars which were built six, eight and ten years ago, are entirely inadequate to take care of the shifting loads. We are reinforcing our cars. I do think, therefore, that this association should put itself on record as favoring something more substantial than wooden construction in the ends of box cars.

L. C. Ord (C. P.): Mr. Gaines' remarks failed to take into consideration one point, which is not simply a question of the strength of the centre sills. If you take the old wooden flat car with wooden sills, and compare its strength with that of the box car, you know there is a very big difference as to the load which these sills will take. In other words, if you have a steel frame box car in which the strength of the car is in the superstructure as well as in the centre sills, why ignore the strength that is in the superstructure, which is preventing the end sill from dropping? Aside from any theoretical consideration of this subject, let us remember, after all is said, that the centre sills usually fail from the ends dropping. If your construction is such that the end sills will not go down, the area of 25 sq. in. that is called for is not necessary. It is manifestly unfair to make a specification which will call for a flat car, or a car with a steel underframe and light superstructure, requiring the same strength of centre sill as a steel superstructure house car in which the end sills are supported.

As to the service that they have given, prior to coming down here, we made a careful investigation and we have found that during the time our steel frame box cars have been in service, having carefully checked our records, we find that there is no case where we have been able to find a bill on owners' defects for the failure of these sills. They have been in service on practically every road on the continent, and therefore they get pretty well all the extremes of service.

We have had several wrecks, notably two in which some coal cars of our own construction, with 30 in. area sills, and almost double the depth of the oldest steel frame box cars, failed at the bolster due to the sills having gone down, whereas the box cars which were next to these coal cars came out of the wreck without the centre sills being damaged.

President Fuller in his opening address, spoke of the importance of not putting into the association records anything which would require additional or heavy expense, unless it was thoroughly warranted. The 25 in. sectional area for centre sills will be required under the form given. They put that limiting figure on cars without the supporting superstructure, and if you refer to the report of the committee it says:

"The side framing must perform the functions of centre sills, and must be subject to the same rules." Yet by establishing that minimum area of 24 in., it means the requirements must be in excess of that. The area of centre sills should be of sufficient strength, but not be required to take care of the eccentric loading; and they cannot do that without requiring as heavy an area as was required for the minimum; while the 24 in. is approximately as steady as for cars with supported ends.

F. F. Gaines: That is a supported car like a box car, and those cars have light channel centre sills and do not come up to the specifications mentioned here. We have any number of those cars coming in every week. They are simply what might be called yard damages, where the centre sills are buckled, or other slight damage, and we have to cut them loose and straighten them out. I am thoroughly in accord with the remarks that we are building centre sills too light. This is not making it obligatory, or standard, but simply favoring good car construction that will stay out on the road and not always be in the shop.

J. J. Tatum (B. & O.): President Fuller, in his address, brought economy forward very forcibly, and I believe it is the duty of this association to support his recommendation. Let us build a substantial car that will not find its way to the shop as frequently as the car of the past has done. We have had wood sill cars fail, and we have had steel sill cars fail because we have not constructed them substantially. The report made by the committee on Car Construction is an able one, worthy of adoption by this association and I hope the organization as a body will support the motion as made and the letter read by the President.

J. J. Hennessey (C. M. & St. P.): Does that wipe out the whole report, or can we refer back to the end of it? I think there are some vital points not discussed at all.

J. J. Hennessey (C. M. & St. P.): I would rather have the sill construction go. There is another class of cars not referred to at all—automobile cars. There are a great many cars where it would be impossible to seal the end doors. Some have double doors; when used as an automobile car they open out and an inside door which can convert the car into a grain car is closed. The recommendation on the end door is too broad and inconsistent, and could not be carried out in many lightly-built cars.

C. A. Schroyer (C. & N. W.): I am of the opinion that if this association does not appoint a special committee on Car Construction, to which committee railroads may refer their drawings of car construction, and from whom they could receive suggestions what to do relative to these matters, that it will not be many years before the U. S. Govern-

ment will do for us in the matter of car construction what he has done in the way of safety appliances. Trainmen without mechanical knowledge have told us what should be done in the matter of safety appliances and that is what will be done on car construction.

We have had a great deal of trouble with sills, light in weight, small in size, and of such shape that there was no lateral strength in them; and in the ordinary emergency application of brakes, they have collapsed on the road. That is not good construction, and insofar as the doors are concerned on the ends of cars, there can be no general rule laid down to meet the conditions. I think that with a standing committee we could reconcile many of the weaknesses that now exist in our construction.

W. F. Kiesel, Jr.: All the box car ends I am acquainted with have inside locks. Do you know of any other, Mr. Hennessey?

J. J. Hennessey: Yes.

W. F. Kiesel: There is no reason why inside locks could not be supplied. It is the best way to close the door and to keep it in shape; therefore it seems the same rule for small end cars could apply to large end ones for automobile cars.

J. J. Hennessey: Where would you seal so it could be read from the outside?

W. F. Kiesel: With the bar you could not open it from the outside; only from the inside.

D. F. Crawford: I would like to endorse all that has been said as a necessity for the railroads of this country producing good cars, and to make a motion that the report of the committee with their recommendations be referred to letter ballot as the recommended practice of this association.

The motion was seconded.

L. C. Ord: The association does not need to specify an area of centre sill as covered by this committee. The only thing is that in the one particular case of the car with the steel superstructure, some consideration should be made of that additional strength. The fact is that the formula which Mr. Kiesel has given is thoroughly satisfactory, if the exception of the sill area recommended is ignored and if the outside end eccentric loading is negligible. It seems to be the understanding of the committee on Car Construction, that not only may the area of centre sill braces be considered on the proper basis, but that where the end sill is of sufficient strength, the value of the support of the sides may be considered as supporting the centre sills and may properly be considered in establishing the minimum centre sill area required. Mr. Burnett's motion was that this should be considered. It does not matter in what form it is considered as long as the case is given sufficient consideration to be sure that it is right. I mean that the recommendation as to standard is not consistent throughout. The area is necessary under all conditions of the cars except where the end of the sill is supported.

W. F. Kiesel: The value of such braces increases the value of the centre sill; and that is supposed to be added as available for centre sill area. Then in the type of car you spoke of, if you have proper bracing between the sides and the centre sill, you are at liberty to add the minimum value of the braces to your centre sill area in considering the construction; but in a box car that is empty other questions arise. If the box car is loaded, you get a decided area, but in the empty car you have no better conditions than in the flat car.

The motion was carried.

The report of the committee on Correspondence and Resolutions was read in abstract by Secretary Taylor as follows:

"The committee on Correspondence and resolutions made its report expressing its appreciation and thanks to President Fuller for his address and for the splendid manner in which he had conducted the affairs of the association during the convention; and to the officers of the association generally for duties well done in handling the many details in connection with the convention; to the various committees that have considered and reported on the various subjects assigned to them; to the committee on arrangments for its effective services in making such complete plans for the meeting; to the railways for courtesies extended; to the hotel men of Atlantic City for their hospitality; to the Railway Supply Manufacturers' Association for their complete exhibition of railway appliances; to the technical press generally and to the *Railway Age Gazette* especially, for the daily report of the convention."

DISCUSSION (CONTINUED).

O. C. Cromwell (B. & O.): I think there are some other subjects which should be referred to the committee on Car Construction. In connection with the application of certain draft gears, where there is an insufficient distance from the bolster to the end of the car, there should be a minimum distance, because we find that certain draft gear works close into a bolster, and you cannot get good construction. That point should be given some consideration, and a minimum distance allowed, or in other words, the bolster placed a certain distance from the end sill so as to give sufficient space in which to apply the gear, which requires the maximum distance of space.

Then there is another consideration: Going into a heavy coupler, we want to provide sufficient means of attachment without conveying the stresses to the underframes.

The end sills should be so arranged as to provide for the proper application of the angle cover. They are not in the same location on many cars; and that should be considered. In connection with the coupler proposition you must give attention to the support of the carrying-iron. There is a great deal of expense involved at the present time in renewing carrying-irons, or equivalent support for the couplers. That matter should be assigned by the executive committee to some committee of the association. The difference in forms is resulting in the spreading of the end sills and the castings surrounding them.

D. F. Crawford: As perhaps many of you are aware, the American Railway Association has before it the consideration of the construction of a standard box car, and it has expressed in some circulars which it has sent to some railways, the hope that we may reach some day a standard box car. In view of that, and the discussion which has gone on before, I would like to move that the committee on Car Construction be transferred from a special committee to a standing committee.

The motion was carried.

O. C. Cromwell: Let us give careful consideration to the question of the strength of the end of open cars in connection with our consideration of the box car. We have all kinds of designs, and many of them are not very effective; that is a matter which should have some consideration.

F. F. Gaines: Mr. Brazier made a remark which was apropos regarding the subject of car doors. Regarding those photographs which were passed around, you fasten the hasp from the door with one bolt, and the first time the car gets a good thump it takes the whole door with it. There are ways to get around it, and we would like to hear more about this car door business.

D. R. MacBain (L. S. & M. S.): This meeting of this association is one of the best that has ever been held. We have gone on record as being in favor of better things. In going through all the big yards of the country, we see not only old cars, but new ones that are fitted with devices unsuited for present-day operation; and while I listened attentively and did not make any comment, I am fully in accord with the recommendations of the car committee, because it tends to better construction which is something that we need. I recently visited a big yard on the New York Central with Mr. Garstang and others, and we were impressed with the condition of the ends of cars—many cars had ends bulged out. We tried to see how many were of the old design and how many of the new design, and in the case of certain class of loading, the same results were had with the new cars as with the old. They were all wooden, indicating that wooden ends, such as we used in the past, are unfit unless you are satisfied to have your car come in for a new end every time it carries a certain kind of freight.

What is true of the end of the car is true of the other parts. The doors are ridiculous. We have made a strenuous effort to bring our door conditions up to a better plane in the last three years, and have succeeded to a very satisfactory degree.

C. A. Schroyer: We are largely a lumber road, and haul a great deal of dressed lumber; there is no commodity we handle that is more destructive on the ends of cars than is dressed lumber, and I note with a good deal of satisfaction the new improved ends for box cars that recently came on the market. I have considered the matter of strengthening car ends, and recently I find that we are depending entirly on the corner post which is improperly secured to the side of the car, as well as the two end posts, to resist the thrust and prevent the shifting of freight on the inside. In our later designs we strengthened the corner posts and secured them to the side of the car, and substituted 2¾ in. lumber to be used up to the height of 4 ft. We are doing that for the reason that we want the inside lining to assist in resisting the stress.

In some tests we made, we have found the timber used was not of sufficient strength. Then we used a thicker timber and under a load of 500 lbs. it showed a defection of 1¾ in. With the thicker stuff we gain that much in the strength of the end provided the end is secured properly to the side. We then put 2⅜ in. plank under the testing machine, and we found that we could get about 1,200 lbs. with the same amount of deflection; and because of this increased strength, we are using the increased thickness of board to obtain increased strength in the ends of the cars. I regret we cannot get closer together on these matters, but the conditions

under which we operate have much to do with the designing of cars.

I regret as far as our association is concerned, that we do not have a larger representation on our road. We should have more general foremen and general inspectors here. They know more about the interchange of cars in one minute than we know in a month, and they would be good men to have here, insofar as our interchange work is concerned.

G. F. Giles: We all realize we have had a great deal of trouble with defective doors and door fastenings, and the ends of box cars, but those are not the sources of all our troubles. We have had more troubles and more wrecks caused by defective arch-bars than anything connected with our equipment, and it is very surprising to me to find that some of the best railroads in this country are still using arch-bar trucks in their new equipment.

One year ago we tried to inspect them by means of a hand-mirror so that the inside could be inspected as readily as the outside. We have found thousands of defective arch-bars. It has resulted in saving a great deal of expense and I am satisfied it prevented many accidents.

J. J. Tatum: It has been said that we expect a better convention next year. I see no reason why we should not have it. We have a committee now on car trucks, we have another committee on couplers, we have another on car construction; and it has been suggested that we take up other important matters. It has also been suggested that something be taken up as to improved ends of cars. That is being taken care of. Just recently in one of our yards, it developed that 65 per cent. of the cars unfit for grain, had wooden ends. Many of them had steel underframes, showing that the designer considered what was needed in the underframe; but failed to consider what was needed in the superstructure.

There is one subject which has not been brought out, which I think should be. A large number of cars are sent out over a line after being received in bad order due to heated journals. It not only represents the expense of replacing the sponging, but it requires renewal of axles due to cut journals. It delays freight traffic on the road and it delays passenger traffic.

The M. C. B. Rules require that the matter of tension of sponging should be given very careful attention—as good as they give their own lines—but it does not specify what the owner of the car should give us. Over 40 per cent. of the cars cut out on the B. & O. are cut out because of hot journals. Cars are delivered with such short time between the time of leaving and receiving, that there is not the necessary time left to withdraw the sponging from the boxes and renew it; therefore, the owning line must help, as well as the operating line.

F. W. Brazier (N. Y. C.): The Coupler committee in its report said that the thanks of the association are due to the manufacturers. We feel that we should take some special action and extend a vote of thanks for their co-operation, and the work they have done in connection with the Coupler committee. I move a vote of thanks be tendered to manufacturers who have worked in connection with the Coupler committee, for the aid which they have given in bringing about the results so far as we have gone.

The motion was seconded and carried.

F. W. Bazier: The New York Central has practically adopted the all-steel ends. We have made some very severe tests with box cars loaded with wheels, and tried to destroy the cars, and I am glad to say that with our standard wooden end which costs us within $15 of the all-steel end, we practically destroyed the cars; while in the case of those equipped with the steel end, we simply had to take off a little section, and repair it and put it back on the track. We are lining these cars, as we believe it stops sweating in case of rain. We have about a thousand of these cars now running.

D. F. Crawford: The statement just made by Mr. Tatum and the one made by Mr. Schroyer and the discussion yesterday, seems to bring out that there is no such thing as a foreign car. We all have so many foreign cars on our lines that we must consider them as home cars, and we must all try to lubricate them and keep them in shape with running repairs, and keep up our own cars, also, so that we can expedite the traffic of the country. There is a great shortage of coal cars, and the old local conditions that made us design particular cars like these, have disappeared or are disappearing. I see a great deal of hope from the committee on Car Construction taking up the problems raised in this discussion.

A. Sternberg: This association should get up a standard door and fixtures for box cars. It would tend to stop the pilfering from cars.

F. W. Brazier: The trouble is we do not follow our own standards. That is why we have the Federal Standards. We had a committee on doors. It would cost fifty cents a car more, however, to put on three hangers in place of two, as recommended by the association ,and so people didn't do it. I want to second the remarks of Mr. Schroyer to the effect that if we do not get busy, the government will get busy. They have been here at our meetings looking for practical man for certain positions. We must unite on some standard. If the railroads had been united in the matter of safety appliances, matters would not have been handled by the government as they were. You will remember that we were then 85 against 15 per cent. If the committee recommends, as I said, three hangers for a door, the superintendent of motive power or some one else connected with him says, put on two, and save fifty cents on each one. I say, get some standard and stick to it.

J. J. Hennessey: The most hopeful thing I heard expressed at this convention was expressed by Mr. Crawford when he stated that the American Railway Association was drifting toward a standard box car. If the American Association may adopt a standard box car, and the association lives up to those dimensions and recommendations, I think it could then build a car that all the railroads of the country could build and maintain at less cost than at the present time.

J. J. Tatum: I am very much interested in this heated journal proposition. I do not know whether or not the association has any standard method for treating for a sponge. That matter should be considered carefully, and a method might be proposed for use as a guide for the companies.

F. W. Brazier: We have with us J. W. Marden, who has been in the car department fifty years, has been retired and pensioned. He is a past president of this association. We will be glad to hear from him.

J. W. Marden: I feel quite complimented at the action which you have taken, and I wish to assure you of my appreciation. The only thing that I can say further is that quite a number of years ago I could do the talking and Mr. Brazier had to listen, but today and for a number of years past, Mr. Brazier has done all the talking and I have been listening. I thank you very much for the opportunity of speaking.

ELECTION OF OFFICERS.

The following officers were elected: President, M. K. Barnum; first vice-president, D. F. Crawford; second vice-president, D. R. MacBain; third vice-president, R. W. Burnet; treasurer, John S. Lentz; executive committee, C. E. Fuller, T. M. Ramsdell, G. F. Giles; committee on nominations, F. W. Brazier, F. H. Clark, A. W. Gibbs, C. E. Fuller and F. F. Gaines.

President Fuller: Before turning over the gavel to my worthy successor, I want to express my appreciation of the work of this convention. I have been coming to these conventions for a good many years, and as has been remarked frequently at this convention, they seem to be growing more and more in favor and more attention is being paid to their work.

We have a duty to perform, but I am sorry to say that I feel that we have not performed that duty to the full extent that we should have done. The managers of the railroads look to us to recommend what should be done in car construction. I am sure that a great many of us believe, and it was so stated on the floor here, indirectly, that the General Managers Association ought to be consulted. We do consult with the General Managers' Association, and our own managers, but it is our function to recommend and to try to bring about conditions that will meet with the requirements of the American railroads; and I feel that in place of being backward and hesitating to recommend standard parts of cars, or anything else that is to our mind for the good of the railroads and the good of the car departments, that we should boldly recommend them. We will make mistakes; if we did not make mistakes we would not do anything, but let us make some mistakes, if necessary, and make them with a view of advancing. The questions of car construction and specifications for car construction are before you. They are a part of your work, and I think this association should take the initiative and give the railroads the benefit of our experience.

I thank you for your kindness and co-operation, and the assistance that I have received. I now have pleasure in turning the gavel over to my worthy successor, Mr. Barnum, and in doing so I want to add one thing, that I hope you will give him full support, and if you give him the same support you have given me, and give him ten per cent. or twenty per cent. more support, you will have next year the best convention you have ever had.

President-Elect Barnum: I believe it is generally conceded that the Master Car Builders' Association represents the largest

vested interests in the United States, and that means in the world; and it is also generally conceded that it is the most influential body in directing the principles which are of most importance to the railroads of this country.

With that preface, I will simply say that I appreciate fully the very great honor that has been conferred upon me in my election to the presidency of this association, and I assure you that I will give the duties of the office my very best efforts. I thank you.

Secretary Taylor: Mr. President, Mr. Scott H. Blewett told me this morning he would like to say a word to this convention. I would like to ask that the privileges of the floor be extended to Mr. Blewett, representing the Railway Supply Manufacturers' Association.

Scott H. Blewett: I trust that my being with you as frequently as I have been in the past few days does not make me a joke, because I assure you that I appreciate the courtesy that you have extended to the Railway Supply Manufacturers' Association, of which I am a member, and to myself personally, in asking me to be with you at other times and at this time.

Mr. Fuller, there have been but few, if any other occurrences in the history of the Master Car Builders' Association and Master Mechanics' Association, like the present, that one man has been honored by being the president of both associations; I think it has never before occurred. I may be mistaken. It is no small evidence of the rare esteem and confidence that the members of these associations have in you. This badge will remind you in the future of this esteem and of this confidence. There are things which words cannot tell. Man's love for man is spoken by deeds. It was man's love for man, and his tender sympathy for man, which indited the telegram last year that informed you of your election to the presidency of this association.

Ex-President Fuller: I regret that I cannot express in words my appreciation of the honor of having held the chair as president of this association, and of being the possessor of this badge. This association is one of the most important in the transportation world, and any man may esteem it an honor to be elected to fill the position of president.

D. F. Crawford: I promised your predecessor, Mr. President, I was not going to say any more. I ask the privilege of you to say a word more. I think this association should acknowledge by a suitable vote of thanks, the splendid service which Mr. Fuller has rendered as president. I have been with Mr. Fuller on the executive committee now for several years, and no one knows more fully than I do, how much he has had the interests of the association at heart. I therefore move that we extend to Mr. Fuller a rising vote of thanks for his highly esteemed services.

The motion was put to a vote and carried, and the meeting then adjourned.

TWO OLD FRIENDS.

Two of the convention visitors who are often seen together are E. B. Leigh, president of the Chicago Railway Equipment Company, and E. L. Adreon, president of the American Brake Shoe & Foundry Company. Messrs. Leigh and Adreon have been friends almost all their lives. They were boys together, both having grown up in St. Louis; and for years they were associated in business. In 1887 Mr. Adreon succeeded Mr. Leigh as president of the American Brake Company. At the same time Mr. Adreon became a director of the National Hollow Brake Beam Company, of which Mr. Leigh became president. This concern was the predecessor of the Chicago Railway Equipment Company. It will be seen that the business relations between the two have extended over a period of over a quarter of a century.

NEW HAVEN ELECTRIC SWITCHING SERVICE.

The New York, New Haven & Hartford now has a heavy freight and switching service operated by electric locomotives, in addition to the passenger service, and it is believed that this is the first instance where a large installation of electric locomotives has been made exclusively for switching service. There are sixteen 80-ton Baldwin-Westinghouse electric switching locomotives used at different points on the system and in the Oak Point and Westchester freight yards. The first electric switching locomotive of this installation displaced two steam switchers that were working on twelve-hour shifts, this being possible because the length of efficient service of electric switchers is not controlled by fire and boiler conditions. By September 1, it is expected that the electrification of the New Haven will be complete between New York City and New Haven.

RAILWAY SUPPLY MANUFACTURERS' COMMITTEE CHAIRMEN.

At a meeting of the executive committee of the Railway Supply Manufacturers' Association, held during the noon hour yesterday, J. D. Conway was re-elected secretary-treasurer.

The following committee chairmen were also elected to serve for the coming year: Finance committee, Geo. N. Riley; exhibit committee, O. F. Ostby; entertainment committee, J. F. Schurch; enrollment committee, Harold A. Brown; transportation committee, Geo. H. Porter; badge committee, C. B. Yardley, Jr.; hotel committee, Geo. L. Morton; by-laws committee, F. M. Nellis.

ATLANTIC CITY DAYS ARE O'ER.

Atlantic City days are o'er,
The time of all the year,
When we are gladdest to go home
Yet glad that we were here.

Not for a year will the M. M.'s,
Nor yet the M. C. B.'s,
Glide gently along in roller chairs,
Fanned by the ocean's breeze.

For one year more they'll stay at home,
Nor stick around at night;
Cafés, supplymen, on the left,
Wife, daughter, dance, on right.

For twelve months more they can't discuss—
Not for another year;
But next June sure will see them back
On the Boardwalk and the Pier.

DEATH OF F. O. KETCHAM.

F. O. Ketcham died of heart failure at 12.30 Wednesday morning after a few hours' illness. He had complained of indigestion for several days but thought it would pass away and gave it little attention. About 9 o'clock in the evening he was found unconscious on the walk near one of the hotels. He was taken to his room and became conscious again but sank rapidly to the end. Mr. Ketcham was 68 years of age, and this is the twenty-eighth consecutive meeting of these associations he had attended. He had been with the firm of E. L. Post & Company for many years. He began his business career in the oil trade, and was the associate of H. H. Rogers and others of that great group of men. His son arrived from Brooklyn, N. Y., early on Wednesday.

CAR DOOR STARTERS.—A new device in the form of a car door starter is being exhibited by the Camel Company, Chicago. It will prevent the use of crow bars or similar instruments for releasing a door from the closed position and operates without damage to either the door or the car.

CANTON-HANKOW RAILWAY, CHINA.—The Canton-Hankow Railway is opened to Lienkiangkou, a point seventy-five miles from Canton. At present owing to the lack of funds a fifteen-mile section between Lienkiangkou and Yingteh, the construction of which was started in May, last year, had been completed at the end of last month. This will be opened to traffic as soon as the iron bridge over the Wengyuanho river extending for the length of 750 ft. is completed.

NEW VICE-PRESIDENT OF THE M. C. B. ASSOCIATION.

At the election of officers of the M. C. B. Association yesterday two of the vice-presidents were advanced and R. W. Burnett, general master car builder of the Canadian Pacific, was chosen as the new vice-president. Mr. Burnett was born at Farmer City, Ill., in 1868 and in 1890 entered the service of the Union Pacific in the car department at Denver, Colo. In 1892 he was connected with the Pennsylvania Railroad at Chicago as a car inspector, and from August, 1892, to July, 1899, was with the Lake Shore & Michigan Southern at Chicago as a foreman and general foreman of the car department at Englewood. The early part of 1900 he spent as general foreman of the car department of the Long Island, going in the latter part of the year to the Central of New Jersey at Elizabethport, N. J., as general foreman of the car department. He remained with that road about five years, and in 1904 went with the Erie, and

R. W. BURNETT,
Newly-Elected Third Vice-President, M. C. B. Association.

was connected with it in the capacities of assistant master car builder and master car builder, with headquarters at Meadville, Pa., until January, 1907. He left the service of the Erie to go with the Canadian Pacific as assistant master car builder, and in 1909, when W. E. Fowler retired, was promoted to general master car builder of the Canadian Pacific.

The importance of his present position is evident when we consider that in addition to being in charge of the car repair and maintenance facilities of this large system, he has charge of the building of new equipment at the Angus shops. This amounted last year to about 300 passenger cars, a large number of which were sleepers, diners and first-class passenger cars, and over 4,000 freight cars. About 4,000 men are employed in the car shops at Angus.

Mellen Chamberlain Mason Hatch, Superintendent Fuel Service of the Lackawanna.

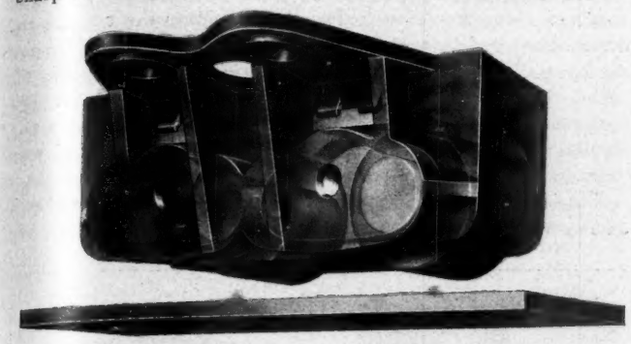
H. J. Small, General Supt. Motive Power, Southern Pacific.

A. M. Darlow, S. M. P., Buffalo & Susquehanna.

A HANKOW TRAMWAY.—The *Ta Han Pao* reports that a tramway car company has been organized at Hankow and that orders have already been sent to Shanghai for the purchase of material.

ROLLER SIDE BEARINGS.

The Joliet side bearing is so constructed that when a car is passing around an ordinary curve the rollers of the bearing run between high carbon steel plates, while on very sharp curves the rollers run free from the upper plate and



Joliet Double Roll Unlimited Travel Side Bearings.

the load is carried on large trunnions. These bearings are made in three different types to suit service requirements, and it is claimed that trouble from "slid flat" rollers and the pounding of side bearings is overcome by their use. The coned roller type are provided with a wear plate that

Joliet Single Roll Unlimited Travel Side Bearings.

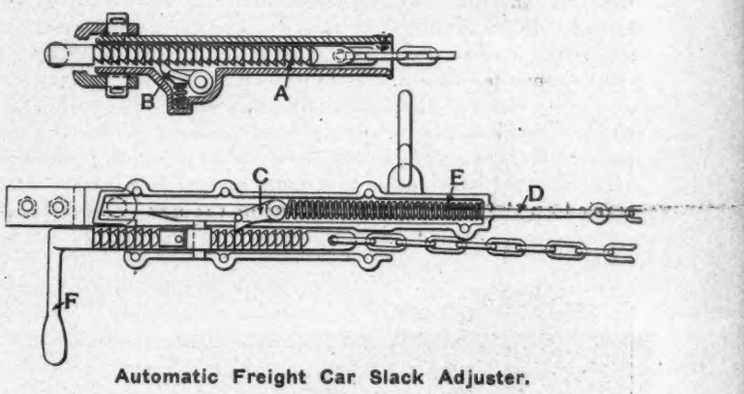
distributes the load equally to the roller at all times. They are manufactured by the Joliet Railway Supply Company, Chicago.

FREIGHT CAR SLACK ADJUSTER.

Among the slack adjusters that are exhibited on the Pier is an inexpensive design for use on freight cars. It is known as the dead lever adjuster. A chain fastens the upper end of the dead lever of the truck to a rack ratcher *A* that is held in place by the dog, *B*. The take-up is effected by means of the dog *C* that is carried on a rod that is attached to the live lever of the truck by means of a chain or rod.

The operation is as follows: When the brakes are applied a certain determined amount of motion of the rod *D* is provided for before the dog *C* drops into the teeth of the ratchet *A*. Then if the brake cylinder travel exceeds this amount the dog drags over the teeth until the end of the stroke. Meanwhile the dog *B* has held the ratchet in place and the stress of the upper end of the dead lever is carried on it. When the brakes are released the spring *E* pushes the rod *D* back into place and the dog *C* carries the ratchet *A* with it by the amount that it moved before engaging in the teeth. As the ratchet is carried back it moves over the dog *B* which finally engages it and holds it in its new and proper position. The arrangement is such that any excess of brake cylinder travel is taken up at the first application either by hand or air.

When it is desired to slacken the connections for the application of brake shoes or for any other purpose the ratchet is moved through a quarter turn by the handle *F*. This shows both dogs on to a smooth part of the ratchet bar, which is round, and it can be pushed ahead until everything is slack. Then, when the shoes are applied the handle drops back into



Automatic Freight Car Slack Adjuster.

place by gravity and the dogs are again in mesh. A pull on the rod readjusts the brakes and everything is ready for work. In case the repairman should fail to adjust the ratchet after applying the shoes the first application of the brakes does it and that one application is all that is lost.

SINGLE-PHASE MOTOR.

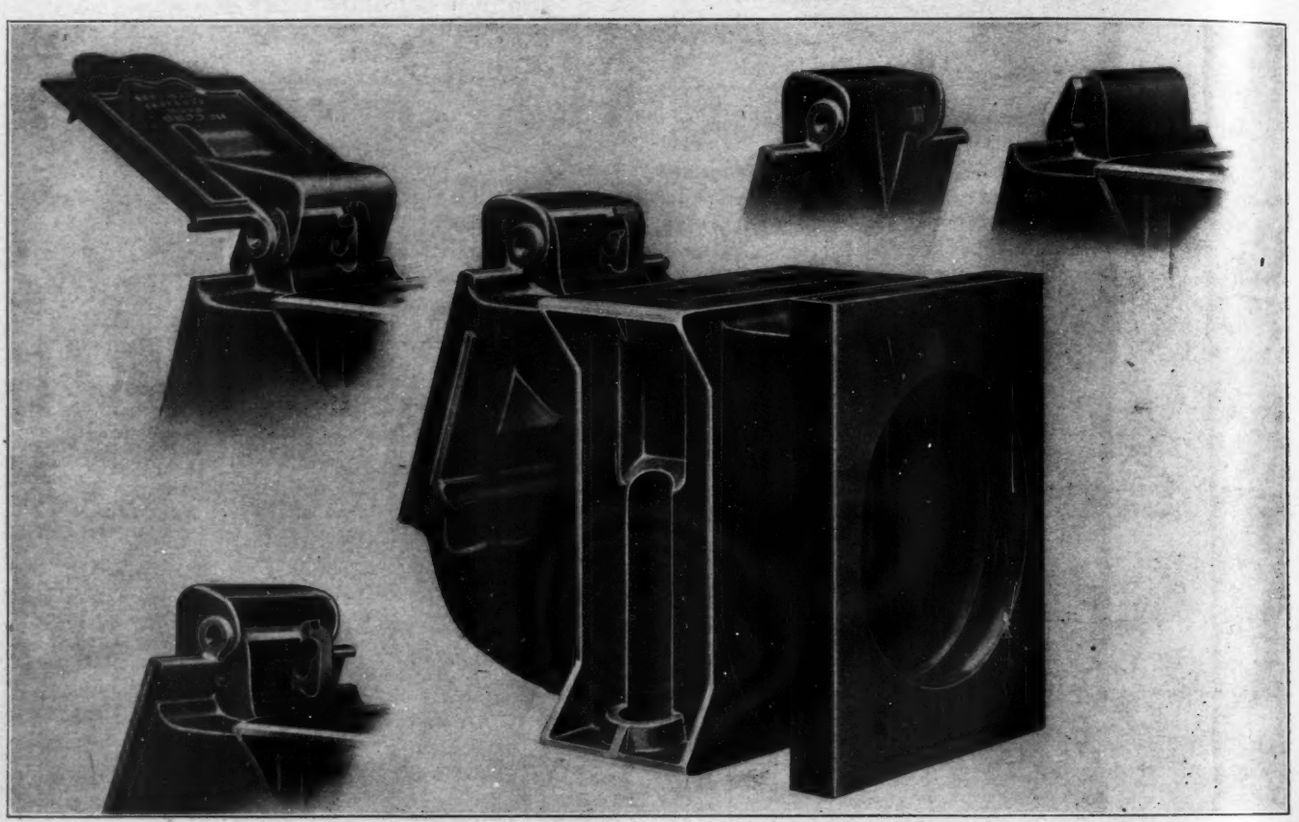
The Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has placed on the market a new single-phase motor, made in capacities of from two to ten horsepower and suitable for constant speed application. This motor is of the repulsion-starting type and runs, when up to speed, as an induction motor. For most applications it can be connected directly to the line but where very low starting current is desired, a starting rheostat can be used. The frame combines strength and radiating capacity with minimum weight and over-all dimensions. The laminations are riveted together under pressure and pressed steel end plates are riveted to the unit thus formed; the foot, or base, is of pressed steel plate securely riveted to the end plates. The bearings are large and the rotor coils are form-wound and arranged to provide good ventilation. The commutator is of the radial type with undercut mica segments and the shaft can be pressed out of the rotor without disturbing the windings or the commutator. The motor will operate on either 110 or 220-volt circuits.

AIR AND ELECTRIC DRILLS.

The Independent Pneumatic Tool Company, Chicago, is showing several new tools at the convention this year, among which are the Thor roller bearing piston air drills. These are not only equipped with roller bearings on each end of the crank shaft, which reduces friction, but also have one-piece connecting rods, Corliss valves, telescopic screw feed and removable crank chamber plates. The sizes T and U Thor turbine air drills for telltale holes in staybolts and other light drilling, are also exhibited, as well as a two-piece long stroke riveting and a single valve chipping, calking and flue beading hammer. The Thor electric drills, which have recently been placed on the market, are also shown. These machines are equipped with roller bearings and a specially designed electric motor suitable for operating on alternating and direct current, or a universal motor for operating on either direct or alternating current.

PINLESS LID JOURNAL BOX.

A change has been made in the McCord pinless lid journal box, by cutting a slot in the top of the hinge lug, which is covered by the hood of the lid when closed. The trunnions are made with a flattened side and are cast integral with the lid on the inside of the hood; the slot in the hinge lug of the box is just wide enough to admit a trunnion with a flat side, in line with the side of the slot. The flat side of the trunnion is so located as to necessitate the sliding upward of the lid close to the face of the box and compressing the spring to within 1/16 in. of the solid position before the lid can be removed. This cannot be done by hand, but requires a special tool which insures against loss of lids. The lid is carried on the upper and lower lips of the box and the trunnions have no bearing on the hinge lug, but perform service only when the lid is being opened or is in an open position. These boxes have been in use for three years and are manufacturd by McCord & Co., Chicago.



McCord Pinless Lid Journal Box Showing Method of Applying the Lid.

OIL BURNERS.

Trouble is often experienced with oil or kerosene burners used for heating damaged car parts because there is a cold area in the centre of the flame which requires the burner to be held so far away from the sheet or frame that much of the heating value is lost. A burner that is being shown in operation at the end of the pier by the Mahr Fuel Oil Burner Company, Minneapolis, Minn., is designed to overcome this fault. This burner has two chambers. The oil and air are ignited in the first chamber and the flame emerges through a choke to the second chamber. On passing through this it draws in free air through an auxiliary air intake, completing the combustion and giving a steady solid flame that will heat the whole area even when in very close contact with a plate.

SECURING SAFETY VALVES DURING TESTS.

The Coale Muffler & Safety Valve Company is exhibiting in the booth of the Nathan Manufacturing Company a device for securing safety valves when making hydrostatic boiler tests. This is in the form of a tool designed to be quickly applied or removed from the safety valve, thus avoiding the expense and delay occasioned by the removal of the safety valve and capping the opening; this and another common practice of screwing the spring bolt down are exceeding objectionable methods. This tool has been developed by H. C. McCarty and is made in a substantial form, with drop forged steel parts and a steel stem extending through the spring bolt and pressing on the lower spring button. It is threaded at its upper end, which makes it applicable to all sizes of valves. Steel jaws engage the spring bolt on the under side of the head, the jaws being held firmly in place by a lock washer.

THERMOSTATIC CAR HEATING CONTROL.

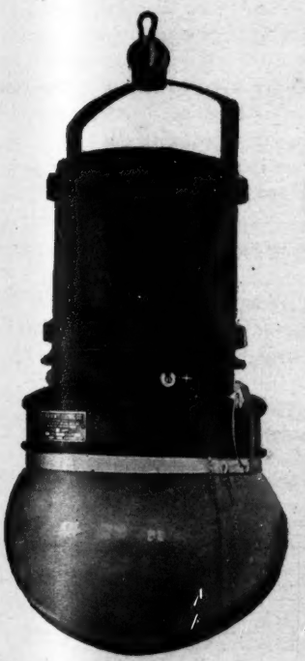
Relying on the judgment of a trainman, who is constantly in and out of a car, for the control of the heating system is often as unsatisfactory as to follow the ideas of individual passengers. The maintaining of a suitable temperature without variation is the ideal condition which is impossible with many of the present car heating applications. The Gold Car Heating and Lighting Company has recently perfected an automatic control which is operated by a thermostat. This is on exhibition together with a number of other recent improvements in car heating and ventilating equipment.

The thermostatic car temperature regulating system consists of a thermostatic temperature regulator, actuating, by hydraulic transmission a control valve placed between the inlet valve and the radiating pipes of the car. The regulator consists of a temperature-sensitive main diaphragm filled with a volatile liquid, with a positive action on a temperature difference of 5 per cent.

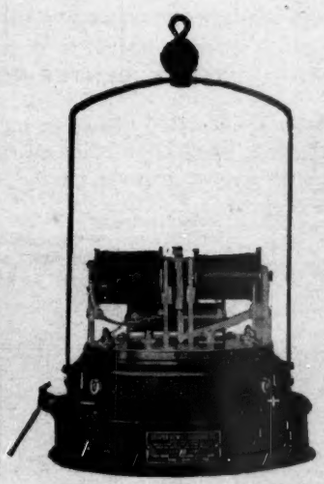
By means of a simple lever arrangement the movement of this diaphagm operates a subsidiary diaphragm (forming the transmitter of a hydraulic system) by exerting pressure on the liquid with which this diaphragm is filled, transmitting it through a pipe to a diaphragm in the control valve which is normally held open. The diaphragm of the control valve is adapted to receive the pulsations in hydraulic pressure coming from the thermostatic temperature regulator. An increase of pressure against the plate of the control valve tends to close the valve against the tension of the spring. Thus the rise of temperature of the air surrounding the regulator will operate to close the valve, and when this temperature falls the consequent lowering of the hydraulic pressure in the diaphragm of the control valve will allow this valve to open, thereby again admitting steam to the radiating pipes.

QUARTZ LAMP.

The Cooper Hewitt Electric Company, Hoboken, N. J., has placed on the market a quartz lamp which is based on the same principle as the Cooper Hewitt lamp. Both lamps use the vapor of mercury as the radiant or luminous body, but in the older type of lamp a long tube of lead glass is employed, while in the quartz lamp a short tube of pure fused quartz or silica is used. Like the Cooper Hewitt lamp, the quartz lamp produces a bluish-green light and is adapted for the illumination of machine shops, drafting rooms, rolling mills, etc., as well as for outdoor use. There is, however, a difference in the light produced in that the quartz lamp gives a larger proportion of yellow and some orange rays. The lamp consists of two elements, the quartz burner and the auxiliary. The burner consists of a quartz tube containing a small amount of mercury, and aluminum supports and a white enameled reflector. The auxiliary consists of a simple apparatus for automatically starting the mercury arc by tipping the burner and of the series inductance and resistance coils necessary for operating the lamp. The mechanism is enclosed in a ventilated canopy of sheet copper, which is readily removed, and the burner is suspended in the lower part of the auxiliary and enclosed in a glass globe. These lamps are made in two sizes, the 110-volt and the 220-volt and have a candlepower of 1000 to 2500.



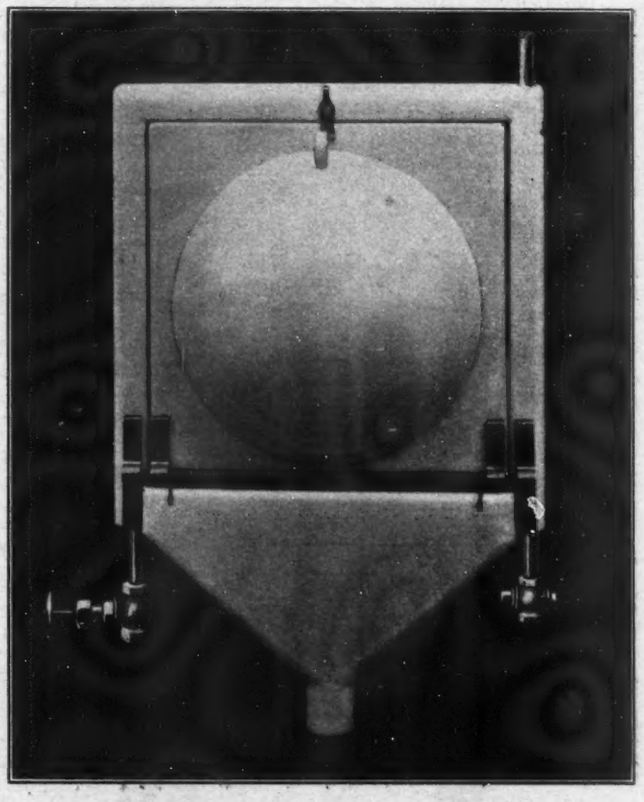
Cooper-Hewitt Quartz Lamp.



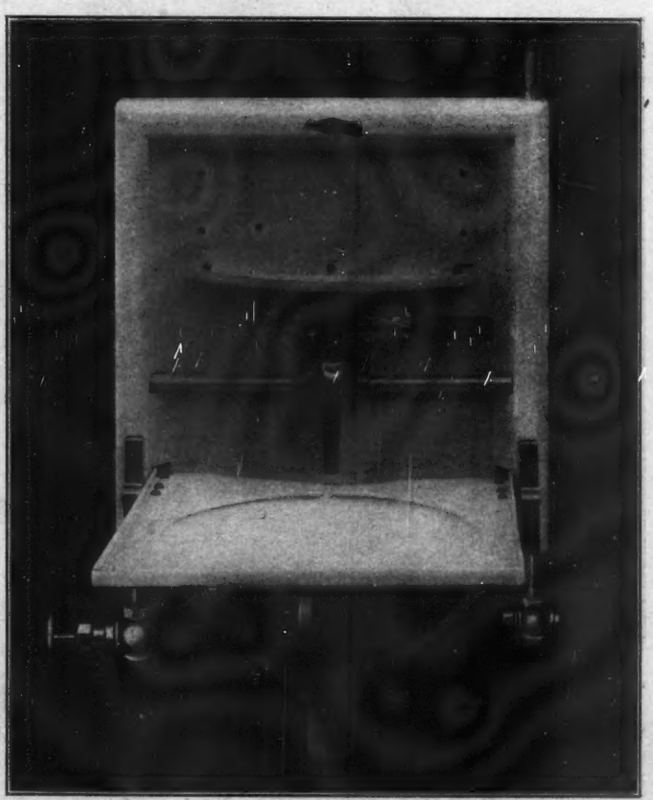
Auxiliary for Cooper-Hewitt Quartz Lamp.

FOLDING LAVATORY.

The steel postal car, which is in the track exhibit on Mississippi Avenue, has included in its fittings an all-steel folding lavatory, arranged for both hot and cold water. It meets all the requirements of the railway mail service standards,



Pressed Steel Folding Lavatory—Closed.

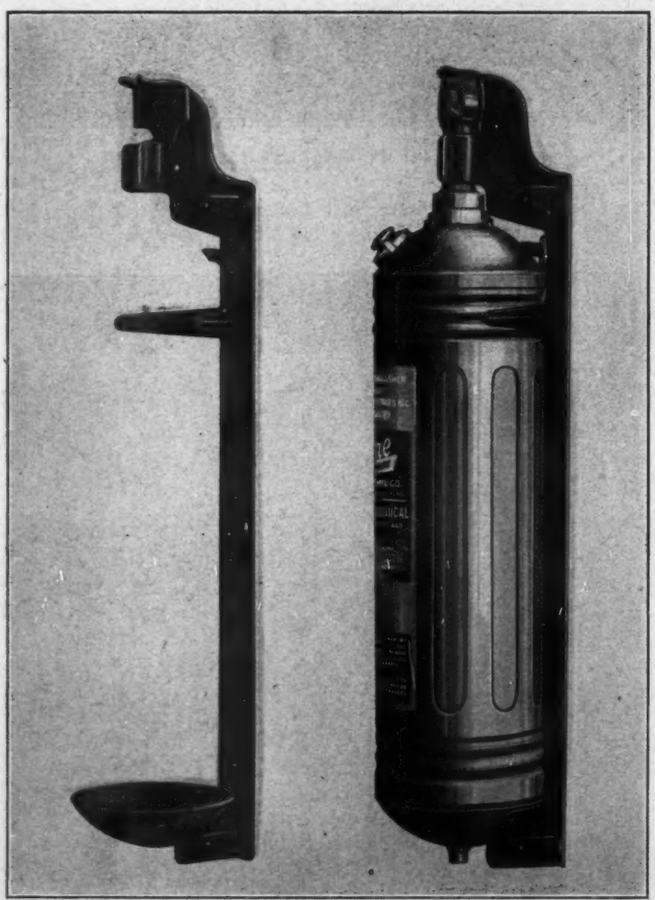


Pressed Steel Folding Lavatory—Open.

and projects only 6 in. from the back of the frame to the outside of the bowl when in the closed position. Being enameled throughout it is quite sanitary. A graduated valve, located in the center of the wash stand frame and connected for both steam and cold water, serves as a mixing chamber from which can be obtained either cold or warm water, the temperature being varied by means of this valve. The port or opening for the steam is small enough to make it impossible to allow enough steam to be mixed with the water to produce a heat that would be liable to scald the operator. The basin itself is provided with a drain at the back of the bowl, so located that when raised to the closed position the bowl automatically drains into the waste pipe connection at the base of the lavatory. The hinge rod is provided with a spring in order to cushion the bowl when swung down into the open position. A perforated soap dish is secured to the frame, and is so located that when the bowl is in the closed position it will, with all the other parts of the mechanism, be covered by the bowl itself. The lavatory is manufactured by the American Car Foundry Company, New York.

PYRENE FIRE EXTINGUISHER BRACKET.

It has been found that in a great many cases where employees use the Pyrene extinguisher, through carelessness the handle is left unlocked after use. The Pyrene Manufacturing Company, New York, in addition to the Pyrene extinguisher, has on exhibition a new type of bracket which

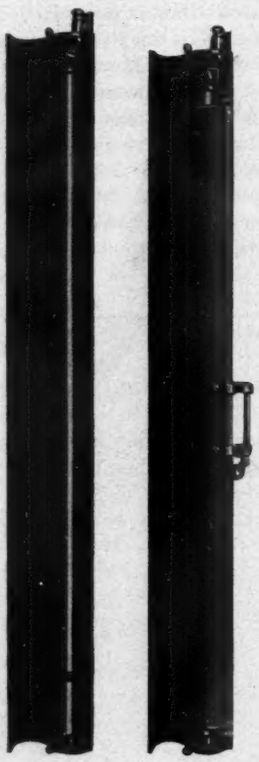


Pyrene Fire Extinguisher and Bracket.

will prevent this. It is so constructed that the extinguisher cannot be placed in it unless the handle is locked, thus preventing evaporation and leaking of the liquid. This bracket is specially designed to withstand the jarring of passenger cars.

VESTIBULE CURTAIN SHIELD.

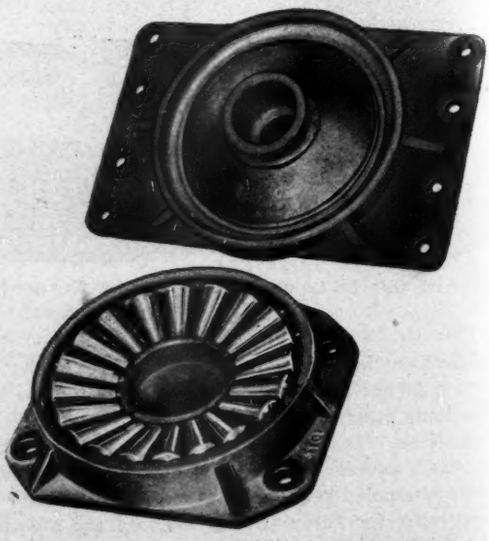
The illustrations show the new Rex vestibule curtain shield which is being exhibited by the Curtain Supply Company, Chicago. The shield is made of heavy gage material and only requires one latch at the top to hold it closed. Brass washers are placed between each hinge and a brass hinge pin is used to prevent rusting. Both curtain brackets are fastened to the casing, the upper bracket being adjustable and held in position by a thumb screw. This arrangement is considered a decided improvement over the old method of adjusting the length of the roller. The adjustable roller, however, can be used in this shield. The shield is so designed that, when opened, the curtain may easily be removed and both edges of the shield are rolled back so as to make a smooth surface for the curtain to pass over. This latter feature also provides an extra large opening for the curtain to pass through. Another improvement in the curtain is in the Rex automatic release handle. The latch has been redesigned to make a more neat arrangement and is simpler in its construction. It is arranged to trip with either a chain or tape, the curtain exhibited being provided with the tape. The device is strong, has but few parts and is adapted to either wood or steel cars.



Vestibule Curtain Shield.

TRUCK CENTERING CENTER PLATE.

The center plate shown in the illustration will, it is claimed, center a truck after rounding curves and assist in returning it to the proper position on the straight track. It is provided



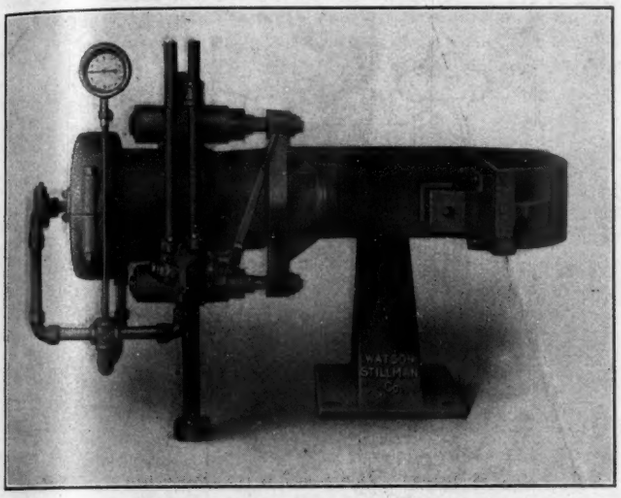
Improved Form of Hartman Center Plate.

with coned rollers which are pitched centrally and operate on an inclined race-way, and have trunnions to prevent their dropping out. The rollers are self-adjusting under load, and the pitching largely overcomes the outward thrust, while the larger ones, if any, work outwardly, and the smaller ones work

toward the center until each roller carries its share of the load. This center plate is an improved form of the Hartman center plate, and it is claimed gives three times the bearing surface of the latter. It is manufactured by the Joliet Railway Supply Company, Chicago.

COUPLER YOKE SHEAR AND RIVETER.

A new type of machine for shearing apart or riveting the yokes to the coupler shank is on exhibition at the booth of the Watson-Stillman Company, New York. Provision is made for having the ram work in either the horizontal plane, as shown

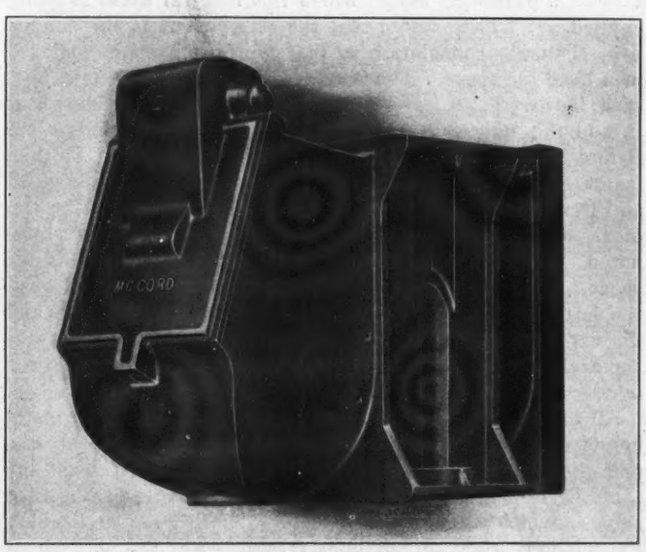


Coupler Yoke Shear and Riveter.

in the illustration, so that the parts are conveniently handled by a crane, or it can be swung to a vertical position if the coupler is to be handled by hand.

LOCKED LID JOURNAL BOX.

A type of journal box with a lid which locks in place when the box is closed, is included in the exhibit of McCord & Company, Chicago. It is shown in the illustration, and is so constructed that a lip on the lower edge of the lid engages with the box and in order to open the lid it is necessary to slide it up the face of the opening far enough to disengage this lip. The lid is made flush with the box all around so that it is impossible to obtain a purchase to slide the lid up with anything but a standard packing tool, which fits the



Journal Box with Locked Lid.

slot formed by the two bosses below the mouth opening. This box is made for use with any McCord or M. C. B. lid.

STEEL INTERIOR FINISH FOR PASSENGER EQUIPMENT.

When all-steel passenger cars began to come into extended use the problems of insulation, repairs and appearance were given serious consideration, but no scheme of construction was developed that satisfied all these three requirements. The result was that a good many roads hesitated about making the change from wood to steel in the interior finish although they built the framing and outside sheathing of steel.

The Hale & Kilburn Company, Philadelphia, Pa., has developed a system of interior finish, which is shown in the illustrations, for making the interiors of steel cars as comfortable and handsome as were those of the old wooden cars,

Integral Steel Finish and Car Interior Before its Application.

Interior of Car Fitted with Integral Steel Finish.

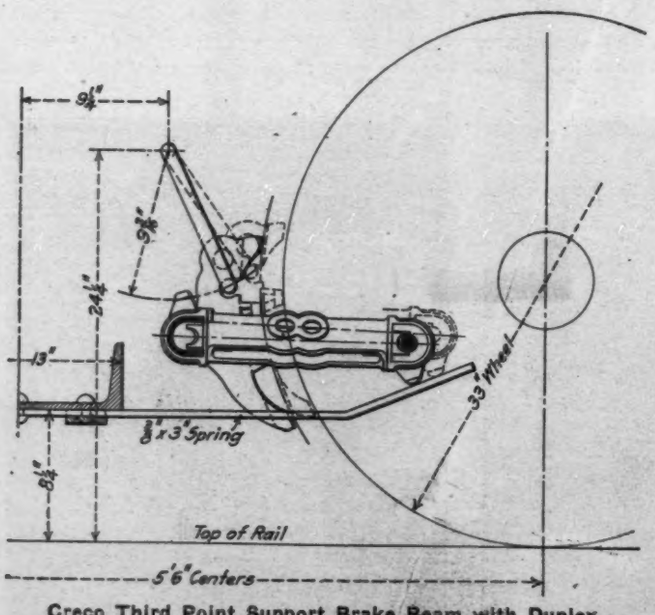
Exterior of Car Fitted with Integral Steel Finish.

and which can be so erected that it may be taken down for repairs without destroying the material, and applied again by the most ordinary labor and without any unusual shop equipment. One of the illustrations shows a partial interior view of a passenger car to which this integral finish is being applied. It will be noted that the side post *A* is surrounded by a channel of insulation so that the post itself is enclosed in a dead air space. The window frame, panel, curtain box, sash, hardware, etc., are all assembled in a unit as shown at *B*, and this unit slips between the posts *A*, the window sill *B* and the top member of the car framing *C*. It is then fastened in place by a row of bolts across the window sill and the bolts which also support the basket rack at the top of *D*, so that machine screws and rivets are entirely eliminated. In addition to the insulating effects of the dead air space and the insulation around the window frame and post, the latter also forms a pad between the interior finish and the car framing and the cheek plates of the window frames themselves are broken by insulated wedges where they overlap.

All of the members are so arranged that there is no metal connection between the outside and the inside of the car, and the frames being made in one piece and all from the same jig do not depend on the framing of the car to be kept square, which should be of material assistance in keeping the windows tight at all times regardless of the shifting of the car framing. The erection of the interior finish in new cars, as can be readily seen, is much simplified, it being possible to assemble each of the units at a convenient place in the shop entirely outside of the car, leaving nothing to be done later but the bolting in place. The bolts are so located that they are easily accessible for removal and any part of the finish can be taken down and erected again without damage, which should materially reduce the cost of repairs. A large number of cars are in service on various trunk lines equipped with this finish, which is part of the exhibit of the Hale & Kilburn Company at booths 408-410.

CRECO BRAKE BEAM.

The illustration shows the application of the new Duplex strut casting to the Creco brake beams as they have been installed on the Boston & Maine. The new strut is provided

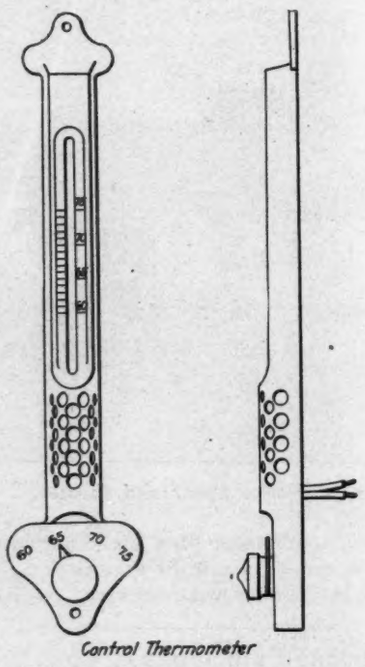


Creco Third Point Support Brake Beam with Duplex Strut Casting.

with two lever pin holes, either of which may be used. This not only increases the life of the strut casting, and thereby keeping the brake beam in service for longer periods, but allows the beam to be used either right or left hand. The sliding third point support feature is the same as has been installed by the Chicago Railway Equipment Company, Chicago, in their recent Creco brake beam installations. This combination in addition to the operating and safety advantages given by the sliding third point support has a further advantage of remaining in active service for longer periods.

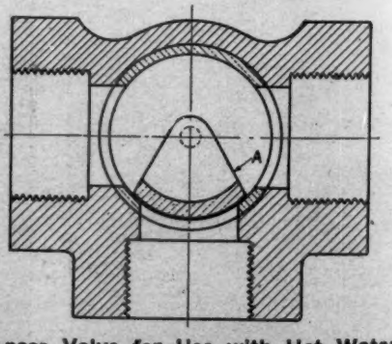
TEMPERATURE REGULATING DEVICES.

The Railway Utility Company, Chicago, is exhibiting this year an improved electric control valve and a by-pass valve for use in regulating the temperature of passenger cars. One of the illustrations shows the control thermometer and



Utility Thermometer and Electric Control Valve.

the application of the thermometer and the automatic electric control valve to the piping system. The valve is connected to the steam supply pipe of the heating system either



By-pass Valve for Use with Hot Water.

in place of or in series with the usual hand controlled valve. Two wires run from the magnetic coil in the upper part of the valve to a junction box containing a fuse box and from

this box two wires run direct to the electric lighting system of the car from which current is available at all times. Two other wires connected the control thermometer with the fuse box. The thermometer is constructed with four platinum wires fused into the glass, one at 60, one at 65, one at 70, and one at 75 degrees. These wires are connected to a switch on the thermometer and by turning the button of this switch to whatever temperature it is desired to maintain, the platinum wire fused in at that temperature will operate the electric control valve and shut off the steam supply when the car is at the temperature desired.

The by-pass valve shown in the other illustration is controlled by the thermometer in a similar manner and is arranged so that it by-passes the circulation of water from any particular state room in sleeping cars which are heated by hot water. In the illustration the valve A is in the position that it would occupy when the temperature of the air was below that for which the thermometer was set, and the hot water can enter the state-room heating pipes.

HYDRAULIC SPEED GEAR.

Among the most interesting of the new devices that are being shown this year is a hydraulic speed gear exhibited by the Waterbury Tool Company, New Britain, Conn. While it has been in use in the United States navy and various foreign countries for a number of years, it has only recently been introduced for commercial purposes. In its various sizes it is suitable for the transmission of power at variable speeds for any desired purpose. In the navy it is used for the operation of the turrets carrying the large 12-in. guns. On railroads, possibly its most valuable use will be in connection with direct connected motor cars where the gas engines can be driven at a constant speed and the speed of the car varied as desired. It is also suitable for use on cranes, hoists, machine tools, automobiles, etc.

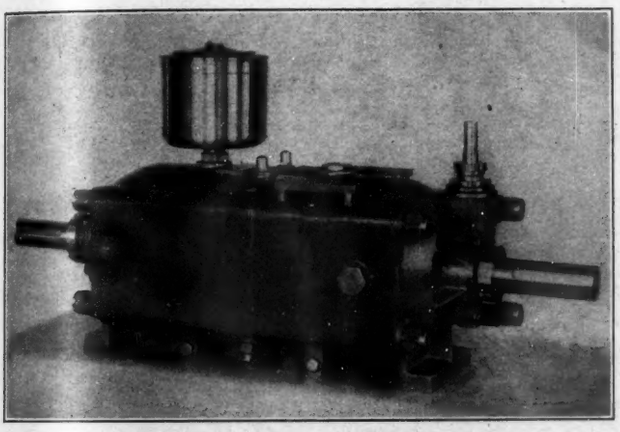


Fig. 1—Hydraulic Speed Gear Assembled.

Among the unique features are the fact that the driven shaft can be at any desired angle with the driving shaft without the loss of efficiency or convenience in the gear. The range of speed control is fully universal and depends on the angle of a plate on the interior of the mechanism.

The complete transmission device is made up essentially of two parts, an oil pump designated as the A-end and an oil engine designated as the B-end. The A-end may be driven by any source of power and is supposed to run at a constant speed in one direction. By the turning of a small control shaft connected with this end the stroke of the pump pistons is varied at will to deliver oil to the engine, or B-end, at the rate necessary to give the required speed and in the direction called for. The B-end is so constructed as to furnish a constant cylinder capacity for each rotation of the shaft. The speed of the B-shaft is therefore definitely determined by the rate at which oil is supplied to the B-end by the pump. No oil is by-passed without doing its share of work in the B-cylinders. The leakage averages about .13 of one per cent. of the oil used in doing the work. All of this takes place between the high and low pressure parts of the mechanism. There is practically no leakage from the gear as a whole. The speed ratios between the A- and B-shafts are, therefore, positive and are definitely determined by the angular position of the control shaft in either direction from its zero, or neutral, position.

Fig. 1 shows an external view of the gear in its most compact form. In this type the A- and B-ends are combined into one working unit; the power enters the unit by the A-shaft which rotates at a constant speed, and is taken out by the B-shaft, at the opposite end of the machine, which rotates at any required speed and in either direction. The small vertical shaft shown in the figure at the right end is the control shaft, and the direction of rotation of the B-shaft is determined by the direction the control shaft is rotated from its zero position and its speed by the angle through which the control shaft has been rotated.

On top of the B-end is an oil expansion box communicating with the oil in the machine. The whole enclosing shell of the gear is entirely filled with oil, although only a small portion of it is under pressure and active in transmitting power. The chief purpose of the expansion box is to provide for the difference of coefficient of expansion between the oil and the metal. The interior of the box is in communication with the

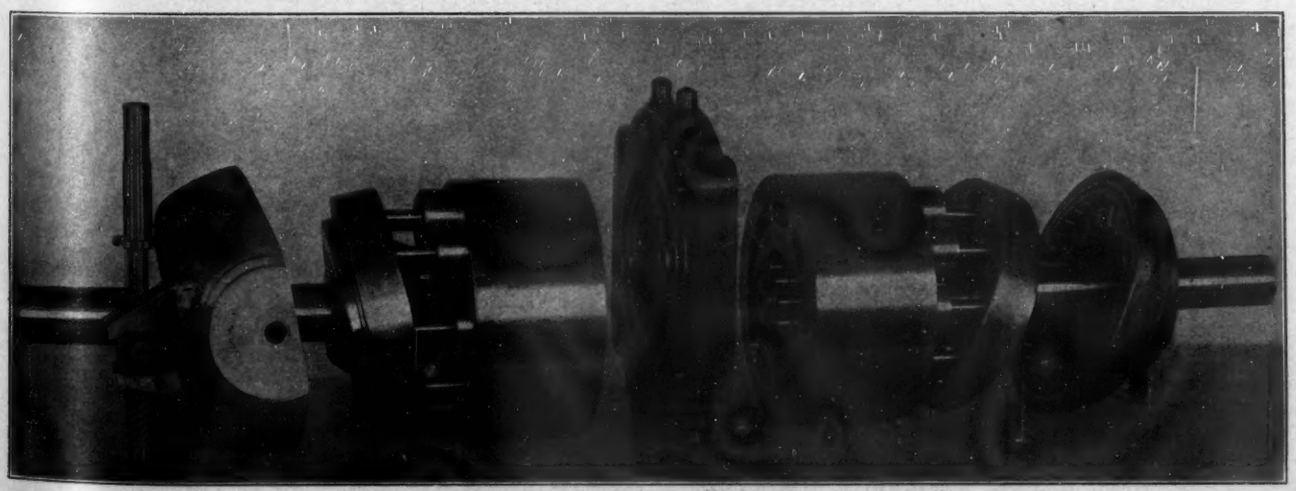


Fig. 2—Working Parts of the Hydraulic Speed Gear.

air through a small hole in its lid; the general oil supply is therefore under only atmospheric pressure.

In Fig. 1 the two ends are united by a common valve plate located across the middle of the machine and through which the oil is circulated between the two ends. This valve plate may be made in almost any shape, permitting the placing of the two ends at any angle or in any position with reference to each other. If desired each end may be provided with a separate valve plate and located in any desired position, the oil circulation being provided for by connecting pipes.

In Fig. 2 the outer cases are removed, leaving the internal parts, the two shaft groups being separated a little from the valve plate, and the angle and tilting boxes being pulled away from the socket rings.

The valve plate stands in the middle. It is also shown alone in Fig. 3. Passing through the plate about half way between its center and periphery are two semi-annular passages. These are for the circulation of the oil between the A- and B-cylinders. When the gear is transmitting power one of these passages is under pressure while the other is in suction. These

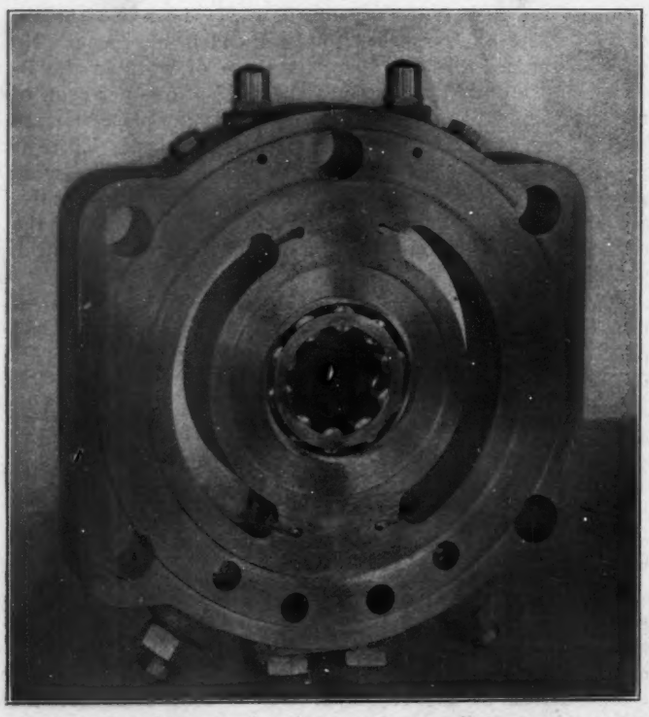


Fig. 3—Valve Plate of the Hydraulic Speed Gear.

two functions are changed according to the direction of rotation of the driven or B-shaft. Connected with the passages are three pairs of valves: at the top are two small needle air valves used only for the escape of air from the passages and cylinders while being filled with oil. At the bottom are two ball check valves used for replenishing any leakage that may take place from the high pressure oil to the low pressure. At the bottom near the replenishing valves are two safety valves to provide relief should the gear be overloaded. There is also connected with each passage near the top a plugged hole for attaching gages in case it is desired to measure the oil pressure, or the load carried. Near the top of the valve plate, and also in connection with all the valves, are holes passing through the plate giving free circulation of the oil between the two ends of the gear within the enclosing cases, or shells.

There are also bolt holes for securing the cases. In the center of the plate are roller bearings for the inner ends of the shafts.

The shaft groups of parts in the two ends are almost identical. A cylinder barrel is keyed slidably and rather freely to the inner end of each shaft. Each barrel has nine cylinders parallel with the shafts and fitted with pistons provided with ball ended connecting rods. The faces of the barrels slide in their revolution against prepared faces on the valve plate, and the cylinder ports in the barrel faces register with the semi-annular passages except as they are passing over the separating "lands" at the top and bottom of the plate. The barrels are held lightly against the faces of the valve plate by spiral springs around the shafts, which are compressed between shoulders on the shaft and counterbored recesses in the barrels. These springs are only intended to hold the barrels in position under no load. When the gear is transmitting power the barrels automatically support themselves.

The piston connecting rods are formed with a ball on each end of each rod, one ball end being secured in a piston and the other in a socket in the socket ring. The socket rings are connected by special universal joints with the shafts, so that while they revolve with the shafts, their planes of revolution may be at any angles to the shafts provided by the setting of the roller bearings on which the socket rings revolve.

The socket ring bearings must carry a very heavy thrust load and at high speed. It is therefore important to use the best possible steel for the purpose. This is made to a special analysis by two companies, one in the United States and one in England.

In the B-end of the gear the socket ring runs in what is called an angle box, which is secured in the end of the case itself through which the shaft passes. It stands at a fixed angle of 20 degrees, giving a constant reciprocation to the B-pistons. In the A-end the box is hung on trunnions and may be adjusted to any desired angle while the gear is running by turning the threaded control shaft. As the load on the trunnions of the box is practically a balanced one, the turning of the control shaft is easy.

The A-shaft, which is connected with the source of power, is supposed to run at a constant speed and in one direction. If the tilting box stands in its vertical or neutral position at right angles to the shaft the pistons are carried around with the cylinder barrel but do not reciprocate. No oil is, therefore, taken from or delivered to the passages in the valve plate. If, however, the tilting box is inclined by turning the control shaft a little, the pistons reciprocate approximately to the extent of the sine of the angle of tilting multiplied by the diameter of the circle of centers of the sockets in the socket ring. Every cylinder during one half of the shaft rotation is in communication with one of the passages in the valve plate and is then receiving oil, which it carries across the "land" and delivers into the other passage during the other half of the shaft rotation. The amount of oil transferred from one passage across to the other passage depends entirely on the displacement of the pistons. But there can be no transfer unless there is a supply to draw from and a space to deliver it into. These are provided by the cylinders of the B-end. When oil is being forced into one of the passages (already full) the pistons in the cylinders of the B-barrel in communication with this passage make room for the oil by sliding back from the valve plate; but they cannot do this without forcing their respective sockets in the socket ring farther from the valve plate. This can only be done by turning the socket ring as a whole in its inclined plane in the angle box. It must be remembered that the B-socket ring, unlike the other, is always inclined in its angle box at an angle of 20 degrees, so that the B-pistons always reciprocate to their full extent at every rotation of the B-shaft. While the pistons facing the high pressure passage of the valve plate are receding to make room for the incoming oil and so imparting rotation to the B-shaft, the pistons facing the low pressure passage are moving towards the valve plate and delivering the oil from their cylinders through the low pressure passage into the suction cylinders of the A-barrel. Since the receiving capacity of the B-cylinders is constant and the delivery capacity of the A-cylinders is varied at will by turning the control shaft, the speed of the B-shaft is corres-

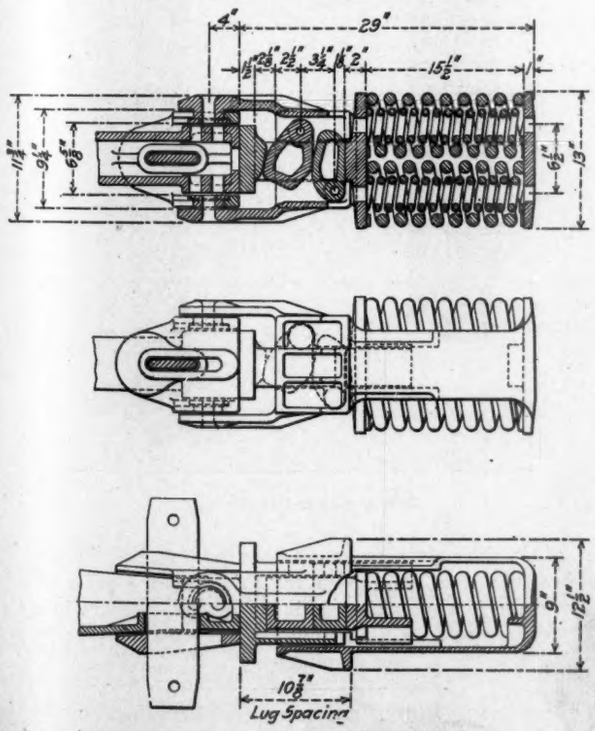
pondingly varied. It will be seen that the only oil actively employed in transmitting power is that in the oil passages of the valve plate and in the cylinders. The enclosing outside cases merely serve as a retaining reservoir and are not subject to any pressure.

The oil pressure in the cylinders and valve plate passages varies directly as the torque resistance which the B-shaft must overcome. The horse power transmitted varies directly as the product of the oil pressure and the speed of rotation of the B-shaft. The normal working oil pressure ranges usually between 300 and 500 lbs. but it may rise to 1000 or even 2000 lbs. to overcome an unusual resistance. In tests pressures as high as 4000 lbs. per square inch have been attained.

The chief advantage of this type of transmission is its great flexibility. The B-shaft may be started under a dead load of any magnitude within the strength limits of the machine, without any fear of overloading the motor or source of power; the speed may then be increased gradually and positively to its maximum without steps or abrupt gradations. Its remarkable flexibility must necessarily give wide differences of efficiency. Under the best conditions efficiencies ranging from 85 per cent. to 91 per cent. are common; under average working conditions the efficiencies vary between 80 per cent. and 85 per cent.; under small loads and low speeds of the B-shaft the efficiencies range from 80 per cent. down to 50 per cent. or less. Of course at a zero speed the horse power efficiency must be zero per cent. while the torque efficiency remains at 95 per cent., and so the horse power efficiencies have a wide range from zero per cent. to 91 per cent., while the torque efficiencies throughout the whole range remain between 90 per cent. and 96 per cent.

IMPROVED LEVER DRAFT GEAR.

The lever type draft gear manufactured by McCord & Company, Chicago, has now been on the market for about seven years. The company is this year exhibiting an improvement of this type which retains the lever principle embodied in former designs, but is equipped with a cast steel sleeve and a key connection, together with integral cast steel yokes. This gear has, in addition, two sets of springs where the older type used but one, which doubles its capacity.



McCord Draft Gear With Adjustable Center Bearing Drawbar Attachment.

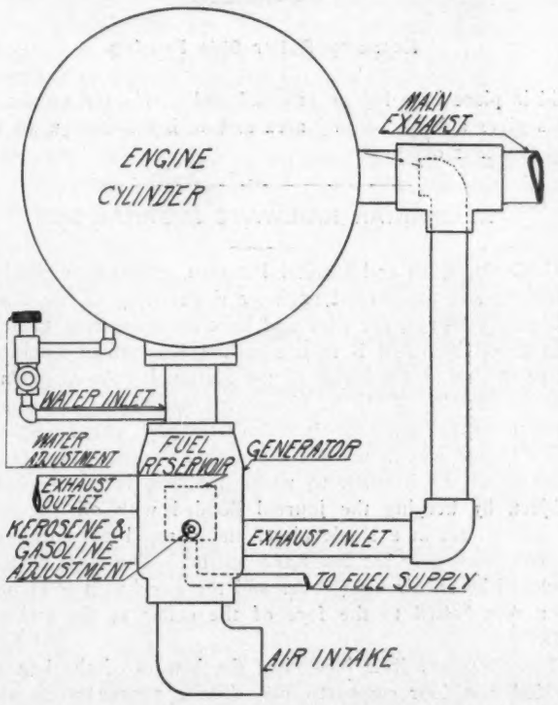
NICKELIZED CAR WHEELS.

A nickelized car wheel which was broken up after completing its full mileage in service is shown in the booth of the Nickel-Chrome Chilled Car Wheel Company. The flange of this wheel shows very little wear, and wheels of this type after making 80,500 miles in freight service on a mountainous road have withstood 175 blows in an M. C. B. drop test and 30 drop blows directly on the flange. There are now 3,000 of these wheels in use, some of them on the Pennsylvania having run for four years, and after making 90,000 miles are still in service. These wheels are in use under 50 ton capacity coal cars, refrigerator cars and in suburban electric service.

KEROSENE GAS GENERATOR

The National Oil Gas Generator Company, Chicago, has recently placed on the market a kerosene gas generator that is applicable to any gasolene engine on the market, working equally well on a "hit and miss" engine as any other. By its use the fuel-cost for operating such engines may be greatly reduced, as the cost of kerosene is much less than gasolene and it also has a greater heat value. The generator is very simple in its construction, and requires little care after once installed and adjusted, no carburetor being required.

The illustration shows in a general way how the generator is connected to a pump feed engine. The gas generator contains a fuel reservoir from which the flow of kerosene is regulated through an adjustment valve to the vaporizing pipe, the air for the mixture being drawn up through the bottom of the generator, and a certain proportion of water admitted into the mixing chamber above the generator. Part of the exhaust is diverted to a chamber surrounding the generator, heating the oil to its boiling point so that it will vaporize more freely. This makes it necessary to heat the generator with a blow torch before starting, or to start the engine on



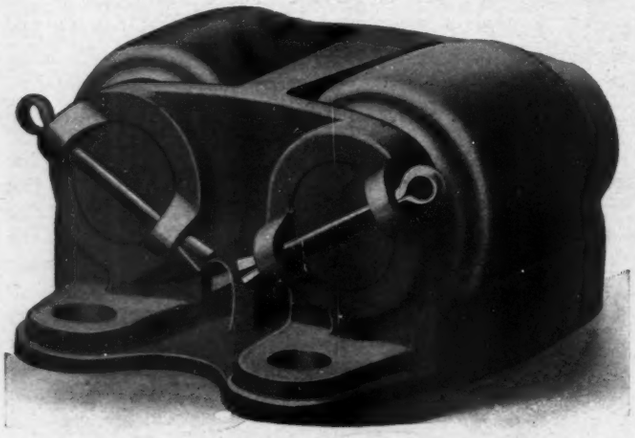
Application of Kerosene Gas Generator to Pump Feed Engine.

gasolene, shifting to kerosene after the generator has been sufficiently warmed up. When once adjusted, the generator is automatically regulated by the suction of the engine, working equally as well with no load as with full load.

With the correct mixture of kerosene gas, water and air, no carbonaceous or other fouling deposit will be formed in the cylinder. The use of kerosene reduces the loss due to vaporization, and is less affected by climate or altitude.

ROLLER SIDE BEARING.

The illustration shows the "Economy" roller side bearing that is being exhibited by the Chicago Railway Equipment Company, Chicago, for the first time. The bearing is self-lubricating and dust-proof. A large roller revolves on a good sized pin that is



Economy Roller Side Bearing.

held in place by a lug on one end and a split pin on the other. This gives a large bearing area and with this design an unlimited travel is obtained.

ROUMANIAN RAILWAYS JOURNAL BOX.

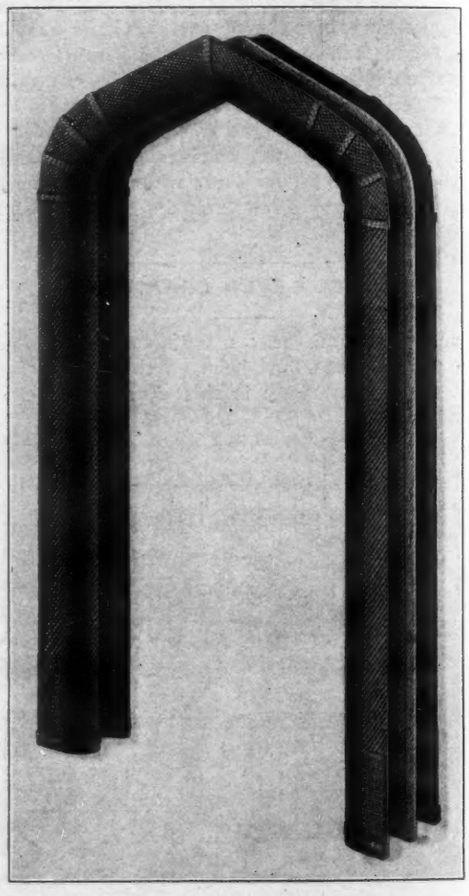
C. C. Orghidan and Dimitri Petrescu, government mechanical inspector and mechanical engineer respectively of the Roumanian state railways, are here and have an interesting model of a journal oil box that is in use on the Roumanian roads. It is on exhibition at the booth of the National Tube Company and was designed by M. G. C. Cosmovicy, engineer of material and traction of the Roumanian state railways. The object sought in the design was to provide a box that would be free from the troubles in the heating, to which the box formerly used was subject, by keeping the journal flooded with oil. It consists of a box cast in a single piece, and a rapid circulation of oil is maintained over the brass and journal. The front of the box is closed by an air tight cover and the circulation is maintained by a disc bolted to the face of the collar at the end of the axle.

The oil reservoir is located at the bottom of the box and is divided into four compartments. These compartments are not only in communication with each other but with a well at the outside of the box in which the disc mentioned turns. The connections between these compartments is such that all of the waste oil, as it flows down from the journal, must pass from the bottom of the second compartment to the third, from the top of which it flows to the fourth. This gives all sediment carried down from the journal ample opportunity to sink to the bottom of these compartments, while the clear oil passes through holes at the top of the third compartment into the fourth. Here it is caught by the revolving disc attached to the axle and carried to the top of the box where it is thrown off into a cavity, whence it flows down to the top of the brass and upon the journal, and down into the compartments again, thus completing the cycle of a complete circulation.

The dust guard at the back consists of two parts, one of which is of wood and the other of a cupped leather ring. The wooden guard is in two pieces held together by a spring which holds them firmly against the axle. At the center of the guard is a groove mating with a similar circumferential one cut in the axle and communicating with a drip passage at the bottom leading down into an oil cellar. Any oil escaping through the leather packing is caught at this groove and prevented from flowing out at the back. The result is that no oil escapes at all. The statement is made that these boxes run on an oil consumption of 1 pint of oil per 100,000 miles.

ACME APEX DIAPHRAGM.

A new style of car diaphragm is being exhibited by the Acme Supply Company, Chicago. This diaphragm, as shown in the illustration, has a pitched roof which sheds water, dirt and cinders readily. It can be used with the old face plate by using a piece of ¼ in. iron sheet attached to the upper



Acme Apex Diaphragm.

part of the face plate and cut to conform to the shape of the diaphragm. It is so constructed that simple repairs may be easily made in the yards. It is self-cleaning, there being no sharp valleys to collect dirt, cinders or moisture, thereby prolonging the life of the diaphragm.

COMBINATION PIPE FITTINGS.—Special fittings made for air brake work which have a ground joint and have been tested to 250 lbs. air pressure while under water, are being exhibited by the Crane Company, Chicago. It is claimed that by the use of these fittings it is possible to save from 20 per cent. to 30 per cent. in the number of screwed joints in the air brake equipment of a locomotive alone.